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Reading Strategy Intervention and Reading Comprehension Success in Bilingual Readers

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in Education

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Abstract

Previous research has found that specific reading strategies predict reading comprehension success in bilingual readers (Frid & Friesen, 2020; Friesen & Frid, 2021). Yet, the pattern in which readers recruit these strategies has not been investigated. In the first study, the patterns of strategy recruitment used by skilled vs. poor bilingual readers was analyzed with previously collected think-aloud data. Results showed that skilled bilingual readers recruit a variety of strategies, they pair necessary inferences with other strategies and utilize comprehension monitoring strategies. In contrast, poor readers persevere on specific strategies, recruit fewer strategies in total and make more incorrect statements. Based on these findings, a strategy flowchart was designed to capture skilled reading behaviours (i.e., “because statements”, making connections). Participants in Study 2 and Study 3 were bilingual English-French adults and children respectively. Participants read stories, conducted think-alouds and answered reading comprehension questions. Half of the participants were randomly assigned to the intervention group (i.e, strategy flowchart) and the other half were in the control group. This research investigated whether teaching bilingual readers to recruit specific strategies improves comprehension. The findings of these studies did not support reading comprehension gains but did demonstrate reading behaviour changes from pre-test to post-test. Implications for French immersion and second-language educators are discussed as well as limitations and next steps for this area of research.

Keywords: Bilingualism, Reading Comprehension, Pattern of Strategy Use, Reading Strategy Intervention, Word Decoding, Vocabulary

Summary for Lay Audience

This research investigated the reading strategies that bilingual adults and children use while reading texts in English and French. While reading, individuals can use strategies where they focus on meaning found directly in the text (i.e., summarizing), where they read “between the lines” (i.e., inferencing), where they connect the content to previous experiences (i.e., background knowledge) or where they think beyond the text (i.e., predicting, questioning, visualizing). This research investigated whether teaching readers to recruit effective strategies would improve reading comprehension and/or change readers’ strategy use. In the first study, previously collected “think-aloud” data were analyzed. Think-aloud responses require the individual to share their thoughts aloud as they are reading a text. Skilled readers used different strategies, they made connections between their think-alouds within a story, and they joined more inferences with other strategies. Poor readers commented on single strategies, they did not make connections between their think-aloud responses, and they made more incorrect statements. Based on the skilled readers’ strategy use, we developed a flowchart strategy intervention tool that taught readers how to utilize successful strategies in an effective manner. The second study recruited bilingual adults and the third study recruited bilingual children from fourth to sixth grade in French immersion programs. Both studies did not observe reading comprehension improvement from time 1 (i.e., before the intervention) to time 2 (i.e., after the intervention). However, the fact that participants were able to follow the flowchart tool appropriately indicates changes in their strategy use.

Co-Authorship Statement

I, Bailey Frid, acknowledge that the three integrated manuscripts included within this thesis all resulted from collaboration with my coauthor. In all three manuscripts, the first author designed the methodologies, conducted literature reviews, sought appropriate ethical approvals, recruited all participants, collected and transcribed all data, led the analysis of all data, and led the construction and writing of all manuscripts. Research assistants within the lab assisted with the transcription and coding of data as well.

The contribution of coauthor Dr. Deanna Friesen was primarily through her research supervision of the primary author, methodology development, theoretical guidance, analysis of the data, and support in the intellectual and editorial process of creating the work and preparing it for publication.

Chapter 2 of this dissertation has been published and the reference is provided below:

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Chapter One: Introduction

Bilingualism has become the norm rather than the exception (Flores & Schissel, 2014; Harris & Nelson, 1992; Ramirez & Kuhl, 2016). One common definition of bilingualism is that individuals use two languages regularly in their everyday lives (Grosjean, 2008). Furthermore, bilingual individuals may be required to read in their second language (L2) daily. This reality raises concerns because individuals learning to read in their L2 often experience greater difficulty with reading comprehension relative to other aspects of language processing (Geva & Farnia, 2012). Experiencing difficulty with text comprehension is problematic since reading comprehension is an important aspect of daily functioning. For instance, information is often presented through text and without reading comprehension it would be challenging to navigate in one's environment. More broadly, academic and career success is related to reading comprehension success (Ransdell, 2001; Savolainen et al., 2008) such that poor comprehension may put second language learners at a disadvantage.

The majority of participants in this study were currently or previously enrolled in French immersion programs. Therefore, the population is worth mentioning to better understand the English-French language background of the readers in this current research. The French immersion context is unique since learners are instructed in French for the majority of their early elementary years (Genesee & Jared, 2008). In addition, immersion programs are considered an additive bilingual environment because while students are learning French, there is no detriment to their English language development (AuYeung et al., 2014). Importantly, the participants in this study were recruited from an anglophone community, meaning their more proficient language was English. The benefit

of assessing participants with the same educational background is that language exposure is similar across participants.

To address the concerns about comprehension success, the purpose of this dissertation is to investigate the importance of recruiting reading strategies in concert, rather than in isolation, while engaging with a text. Previous research has identified strategies that predict reading comprehension performance (Frid & Friesen, 2020; Friesen & Frid, 2021; Pourhosein Gilakjani & Sabouri, 2016; Uhl-Chamot & El-Dinary, 1999). Yet, these studies have not focused on the pattern in which readers recruit strategies that lead to more successful comprehension. Chapter 2 focused on the reading strategy patterns skilled bilingual readers recruited in comparison to less skilled readers. Based on these findings, a flowchart intervention was implemented with bilingual adults (Chapter 3) and children (Chapter 4). The purpose of these studies was to determine if the flowchart was used effectively and if it resulted in gains in comprehension performance.

1.1 Theoretical Perspectives of Reading Comprehension

Language knowledge is one of the most studied aspects of reading comprehension (i.e., vocabulary knowledge and reading decoding). Gough and Tunmer (1986) introduced a theoretical framework known as the Simple View of Reading. It defines reading comprehension as the product of decoding and language comprehension. Within this framework, poor language knowledge or decoding ability each are believed to negatively impact reading comprehension success (e.g., Erdos et al., 2014; Geva & Farnia, 2012; Hoover & Gough, 1990; Sadeghi et al., 2014). Frid and Friesen (2020) demonstrated that French immersion students with more vocabulary knowledge and greater skilled decoding ability had higher reading comprehension scores in English and French. Oullette (2006) established that expressive vocabulary is a predictor of visual

word recognition and reading comprehension. Therefore, vocabulary knowledge (i.e., receptive & expressive) as well as word reading each contribute to one's reading comprehension success.

Alternate theories, such as the Reading Rope Model (RRM; Scarborough, 2001), have supported the same claims about the importance of reading fluency/decoding and vocabulary knowledge on reading comprehension. However, the RRM differs from the SVR model because it further specifies which components of language comprehension (i.e., background knowledge, vocabulary, language structures, verbal reasoning, and literacy knowledge) and word recognition (i.e., phonological awareness, decoding, and sight recognition) results in skilled reading. Furthermore, as individuals become more skilled readers, they become more strategic in their recruitment of language comprehension components (Friesen & Haigh, 2018). Similar to the SVR model, when readers have less knowledge about L2 vocabulary and about L2 language structure, their reading comprehension will likely be less successful (Trapman et al., 2014).

The finding that bilinguals tend to exhibit lower scores on reading comprehension measures relative to their monolingual peers is likely primarily due to lower L2 language proficiency (Kolić-Vehovec & Bajšanski, 2007). Bialystok et al. (2010) investigated receptive vocabulary knowledge differences between bilingual and monolingual children. They found that bilingual children tend to have smaller vocabularies in their L2 (in this case, English). Importantly, not all bilinguals have lower proficiency in their L2 than monolinguals of that language. However, smaller L2 vocabularies may be due to L2 language users learning their L2 later (Iluz-Cohen & Armon-Lotem, 2013; Snow & Hoefnagel-Hohle, 1978) and/or having fewer opportunities to read in their less-proficient

language (Jimenez et al., 1996; Luk et al., 2011; Yow & Li, 2015). Consequently, readers with less language knowledge would likely have difficulty attending to information beyond the literal wording of the text or would have difficulty comprehending the vocabulary used within the text (Friesen & Jared, 2007). However, language knowledge is not the only indicator of text comprehension success.

1.2 Reading Strategy Recruitment

Reading comprehension success is not solely dependent on an individual's language proficiency, but also on the reader's method of employing strategic behaviours (Scarborough, 2001). Reading strategies assist learners in organizing information in their mental text representations (Mayer, 1996). According to Paris et al. (1991), reading strategies are actions selected purposefully by the reader to achieve particular goals. In this case, the goal is reading comprehension. Common strategies that have been investigated in the literature include (i) summarizing – paraphrasing the reading, (ii) inferencing – deducing information based on the text, (iii) predicting – guessing what will happen next, (iv) background knowledge – taking into account previous experiences related to the text, (v) connecting – remembering previous information from the story, (vi) questioning – asking questions about the text, or (vii) visualizing – picturing what is happening in the text (Blachowicz & Ogle, 2017; Coiro & Dobler, 2007).

Reading strategies have been shown to uniquely impact successful reading. Summarizing is a meaning-based strategy that promotes the reader's memory of the text (Pourhosein Gilakjani & Sabouri, 2016). According to Honig et al. (2000), effective summarizing requires recognition of the elements in the story that stimulate the reader to understand what is occurring in the text. Inferencing requires the reader to integrate information in the text with their previous knowledge (Pourhosein et al., 2016).

Attaprechakul (2013) noted that inferencing helps the reader to determine the meaning of unfamiliar words and to understand what is occurring beyond the literal words of the text. With respect to predicting, successful readers make hypotheses about what will occur next, or what opinions the author will offer next (Pourhosein et al., 2016). Gillet and Temple (1994) suggested that strong readers will assess their predictions and change them if they are not supported by the text. Background knowledge requires the reader to activate their previous knowledge and apply it to the text, which helps them to understand what they are reading (Pourhosein et al., 2016). The schema theory proposes that as individuals learn about the world, they create a series of knowledge structures (Anderson et al., 1977). These schemas develop and change as the individual learns new information through experience and reading (Pourhosein et al., 2016). In other words, new information being read may relate to the reader's existing knowledge, which allows the reader to comprehend what is going on in the text. Connecting can be defined in different ways (i.e., to oneself, to the text, to the world). For this dissertation, connecting is the process of noting key information earlier in a text and relating it to the current content. Acknowledgement of one's understanding is involved in the connecting strategy (Frid & Friesen, 2020). Asking appropriate questions allows successful readers to attend to the most important information in a text (Wood et al., 1995). Stating relevant questions aids the reader in focusing on comprehension difficulties and enables comprehension repair behaviours (Pressley et al., 1995). Visualizing involves the reader creating a mental picture of the text (Pourhosein et al., 2016). Readers who form a mental image are better able to remember what they have read than those who do not (De Koning & van der

Schoot, 2013; Pressley, 1976). Research on strategy recruitment is typically studied in conjunction with reading comprehension success.

1.3 Theoretical Perspectives of Reading Strategies

Previous work has advanced theories to explain the relationship between strategic behaviours and reading comprehension success. The Construction Integration (CI) model describes the process of creating a text representation (Kintsch, 1988, 2005). This model does not expressly describe a connection between reading strategies and reading success, yet it is a perspective being brought to the model. According to the CI model, there are three levels of text representation that are created while reading. They include (1) surface form - the literal wording of a text, (2) textbase - the meaning-based aspects of a text such as the main ideas or themes, and (3) situation model - the combination of the textbase with the reader's background knowledge. Along with these three levels of text representation, a construction process and integration process take place for textual understanding. The construction process involves (1) forming the propositions (i.e., meaningful units) that directly correspond to what is being read, (2) elaborating on the concepts by linking smaller units to the reader's general knowledge net, (3) inferring certain pieces from the text, and (4) assigning connection strengths to the elements that have been created. Key ideas get assigned stronger weights. The integration process dismisses irrelevant elements from the text and focuses on knowledge-based elements (Kintsch, 1988; Perfetti & Stafura, 2014; Zwaan, 2003). Readers build these three levels of mental text representation through a construction and integration process to integrate the novel information with their background knowledge.

Graesser et al. (1994) also took a constructionist approach to identifying three principles that readers tend to adhere to: (a) reading goals, which states that the

information the reader chooses to attend to is dependent on the nature of their reading goals, (b) coherence, which states that the reader attempts to connect different units of information to construct meaning from the text, and (c) explanation, which states that a good comprehender thinks critically about a text and generates explanations of why events and actions in the text occur. Reader goals specify the type of mental text representation the reader is looking to generate and the latter two enable the reader to achieve these goals. Therefore, good readers will likely use coherence strategies such as inferencing and summarizing to gain a meaning-based representation of a text. Additionally, good readers will likely use explanation strategies such as questioning, predicting and background knowledge that require extrapolation beyond the text. This approach provides a perspective that places considerable weight on strategy use rather than focusing exclusively on language proficiency.

1.4 Strategic Reading Behaviour Predicts Reading Comprehension Success

A specific concern with studies investigating reading strategies and reading comprehension is determining the best method of measuring the use of reading strategies (Muijselaar et al., 2017). Think-aloud procedures allow the reader to talk about what they are thinking during an online reading task, enabling a real-time account of readers' thought processes. In the case of reading, Lytle (1982) described think-alouds as the reflection of what a reader is doing at a particular point in time to best understand what they are reading. Studies that have used think-alouds tend to code readers' verbal responses as strategies (Block, 1986; Frid & Friesen, 2020; Friesen & Frid, 2021; Uhl-Chamot, 2004). The benefit of knowing exactly which strategies readers recruit while reading offers rich information about the process of text comprehension.

Uhl-Chamot and El-Dinary's study (1999) investigated the learning strategy knowledge that immersion students possessed using a think-aloud protocol. Students were characterized as high or low ability students based on their performance on a reading/writing task. The number of known learning strategies did not differ between high and low performing students, but the types of learning strategies differed. For instance, low ability students commented more on phonetic decoding and high ability students commented more on background knowledge strategies. They concluded that good learners may better monitor and recruit various strategies while poor learners recruit less-effective strategies. Nonetheless, this study did not focus on the relationship between reading strategies and reading comprehension, but instead, the relationship between learning strategies and reading/writing task proficiency.

The most recent studies to explore strategy recruitment and reading comprehension success were conducted by Frid and Friesen (2020), and Friesen and Frid (2021). The main purpose of these studies was to investigate the reading strategies readers recruit in their L1 and L2, and whether these strategies predict reading comprehension performance. These studies recruited English-French bilingual adults and children. Participants completed language proficiency tasks (i.e., vocabulary knowledge and reading decoding) as well as a think aloud reading comprehension task in both English and French. The findings indicated that language proficiency and reading strategy recruitment each predicted reading comprehension success in English and French (Friesen & Frid, 2021; Frid & Friesen, 2020). By grouping strategies together with a factor analysis, results revealed that text analysis strategies (e.g., text structure and vocabulary, connecting) and meaning extraction strategies (e.g., necessary inferencing,

elaborative inferencing) each uniquely predicted reading comprehension success.

Despite determining strategies that predict greater performance on the reading comprehension measure, this previous work revealed that bilingual participants had room for improvement in reading comprehension scores in both their L1 and L2. Additionally, large individual differences existed in readers' strategy choice. Of interest here, is to better understand the pattern of strategy use for reading comprehension success.

1.5 Patterned Reading Strategy Recruitment

Overall, reading strategies have been shown to improve reading comprehension (McNamara, 2007; Muijselaar et al., 2017). However, the way in which individuals recruit strategies has seldomly been investigated. The first study in this dissertation (Chapter 2) investigates patterns of reading strategy recruitment in strong vs. weak readers for both L1 and L2. Typically, strategies are studied in isolation and not often how strategies work together. For instance, making a necessary inference allows the reader to fill in gaps in the text and predict information to come (Pressley & Afflerbach, 1995; Vacca et al., 1995). Therefore, inferencing in conjunction with predicting may allow the reader to gain a better mental representation of the text. Similarly, readers incorporate background knowledge to make inferences and those with rich background knowledge are more likely to make sound inferences (Pressley, 2000). The argument here is that it is important to understand how these strategies work in concert to better understand how a mental text representation is formed.

In a study by Huang (2018), reading strategy clusters and pairs were investigated among Chinese-foreign-language students. The purpose of this research was to investigate how strategies are orchestrated by L2 Chinese readers to enhance comprehension. Think-aloud responses and recall questions were measured in this study.

Three clusters/pairs were identified that assisted in the readers' ability to monitor their comprehension. The reader's ability to refer to context and paraphrase, to reread/summarize then refer to context, and to discuss text structure all led to successful monitoring of comprehension. Therefore, grouping strategies together appears to be associated with reading comprehension success.

Even though some readers are recruiting strategies effectively in concert, there are some readers who are recruiting strategies in isolation or are recruiting less-effective strategies in collaboration (Frid & Friesen, 2021). These readers may not be understanding what they are reading as thoroughly as those who are recruiting strategies in a more skilled manner. Key then is whether readers can be taught how to recruit effective pairings of strategies with the goal of improving reading comprehension (this approach is the focus of Chapters 3 and 4). Once there is a better understanding of what skilled and poor readers are doing while engaging with texts, this knowledge can inform further reading strategy interventions.

1.6 Reading Strategy Instruction

Reading strategy instruction is the explicit and systematic teaching of reading strategies (Mason et al., 1984; Souvignier & Antoniou, 2007; Tiruneh, 2014). Previous research has demonstrated that reading strategy instruction increases readers' ability to understand and remember what they are reading (Brown et al., 1996; Gaskins et al., 2002; Ness, 2011). According to Duke and Pearson (2002), good readers engage in active reading, scan the text to familiarize themselves with the structure, make predictions, question the meanings they make, identify unfamiliar words and concepts, integrate prior knowledge, and monitor their understanding. Given this knowledge about how good readers interact with a text, teaching individuals to engage in these behaviours may

improve reading comprehension. According to Janzen and Stoller (1998), when selecting strategies for targeted instruction, it is important to consider the complexity of the reading process and the range of strategic thinking required for reading. In this dissertation, the goal of strategic reading was for readers to retain the content for later retrieval by creating a cohesive mental text representation.

The way in which strategy interventions are often implemented encompasses five phases: (1) explicit description of strategies and how strategies should be used, (2) modeling of the strategy, (3) collaborative use of the strategy, (4) guided practice using the strategy, and (5) independent use of the strategy (Duke & Pearson, 2002). For example, these stages are used in the reciprocal teaching approach (Okkinga et al., 2018; Palincsar, 1982; Pilten, 2016; Tarchi & Pinto, 2016). With respect to reading, Palincsar and Brown (1984) determined reciprocal teaching as a reading comprehension method in which students collaboratively apply reading strategies to construct meaning from a text. The teacher's role is to scaffold and guide readers to independently recruit strategies. Reciprocal teaching is a form of expert scaffolding in the classroom (Puntambekar & Hubscher, 2005). In the context of reading, the goal of reciprocal teaching is for the student to become increasingly more comfortable recruiting the strategy without any assistance.

Albeckay (2014) completed a study in Libya with a group of English as a foreign language (EFL) university students. The participants in the experimental group completed a Critical Reading Program (i.e., targeting the identification of facts/opinions, understanding the author's perspective, making inferences and evaluations) over a 10-week period and those students in the control group did not complete this program. Pre-

test and post-test measures of reading comprehension and strategy use were implemented. Participants in the experimental group who were less-skilled readers exhibited increased comprehension scores and knowledge of strategies. However, those in the experimental group who were skilled readers did not appear to be impacted by the intervention. This finding may suggest that strong bilingual readers are already recruiting effective strategies and poor readers benefit from strategy intervention the most.

Macaro and Erler (2008) implemented a 14-month reading intervention program among seventh- and eighth-grade beginner learners of French as an L2 in England. Pre- and post-test intervention measurements included reading comprehension in French, and a questionnaire about learners' strategies. There were three stages involved in the intervention for students in the experimental group: (1) familiar strategies were discussed, and new strategies were introduced, (2) scaffolded practice of old and new strategies were implemented, and (3) evaluation of strategies was completed. The students in the control group did not receive the intervention. The findings suggested that strategy instruction improved comprehension of simple and elaborative texts and brought about changes in strategy use. These studies demonstrate the relevance of strategy instruction on readers' strategic behaviour and reading comprehension gains.

1.7 Single Session Flowchart-Style Intervention

Previous intervention studies examined how teaching specific strategies impacts reading comprehension but not how strategies work together. In addition, strategy interventions typically take place over multiple sessions. Chapter 3 and Chapter 4 implemented a single session reading strategy interventions that required participants to follow a flowchart of strategy pathways. Participants could choose from different strategies (i.e., summarizing, predicting, visualizing, questioning, and text structure) and

were required to make a “because statement” (i.e., inference) after each strategy. They were encouraged to choose several strategies within a single verbalization, and they were required to connect previous thoughts to current ones based on the development of the texts being read. Of interest is whether a single session intervention where readers have access to a flowchart is sufficient to produce gains in comprehension.

There is evidence to suggest that a single-session intervention influences reading comprehension gains. Wanzek and Vaughn (2008) assigned students to a single dose reading intervention, a double dose reading intervention or no intervention. Participants were assessed on word identification, word decoding and passage comprehension. The intervention involved instruction on phonics and word recognition, fluency, passage reading and comprehension. The findings demonstrated that students’ responses to the single-dose and double-dose interventions each improved reading comprehension. Individuals who did not receive intervention did not demonstrate gains. Thus, here, a single-session intervention was sufficient for reading comprehension gains. Still unknown is if a single-session reading strategy intervention is similarly beneficial.

A flowchart-style intervention has yet to be included in strategy instruction research. However, Jiang and Grabe (2007) noted that graphic organizers have been recommended and used in current classrooms. Graphic organizers can represent the structure of a text and are accessible to the reader (DiCecco & Gleason, 2002; Kools et al., 2006). Previous research has demonstrated the benefits of using flowcharting to enhance reading comprehension (Arai et al., 2014; Boothby & Alvermann, 1984; Duke & Pearson, 2009; Geva, 1983; Kashani Mahmood et al., 2013). Kashani Mahmood et al. (2013) required Iranian English foreign language readers to use a graphic organizer

during a reading comprehension task. Those in the intervention group were taught reading using the graphic organizer and found gains in reading in comparison to individuals in the control group who did not have access to the graphic organizer. Similarly, Boothby and Alvermann (1984) had participants fill out a partially completed graphic organizer while reading and the results showed that the individuals in the graphic organizer group scored higher on a recall test in comparison to those in the control group. Thus, reading instruction research that has involved visual organizers demonstrates gains in the skill being measured.

1.8 Organization of Present Work

This dissertation addresses three related research questions. Chapter 2 investigates the strategies that bilingual readers recruit in conjunction that result in reading comprehension success and failure. Based on Chapter 2's findings, Chapter 3 and 4 explore whether a single-session flowchart-style intervention influences readers' strategic behaviours and results in comprehension gains.

Chapter 2 focuses on differences in strategy use patterns between skilled readers and less-skilled readers. A subset of think-aloud responses was taken from Frid and Friesen's (2020) and Friesen and Frid's (2021) papers. The highest and lowest reading comprehension performers were analyzed to qualitatively determine differences in strategic behaviours. Reading strategy patterns were also analyzed within the English (L1) and French (L2) texts to observe whether language differences existed. Participants were adults and children. The purpose of comparing bilingual adult and child reading strategy patterns is to examine whether differences exist as a factor of age. Kress (2003) explained that the process of meaning-making is similar for adults and children, which

may result in similar strategy patterns emerging. The findings from Chapter 2 informed the design of the flowchart intervention implemented in Chapters 3 and 4.

Chapter 3 investigates whether a single-session intervention would improve reading comprehension scores and alter participants' method of strategy recruitment in bilingual adults, whereas Chapter 4 does the same in bilingual children. A single-session intervention was chosen for this dissertation since the intervention itself incorporated strategy pathways indicative of skilled reading. A single-session was hypothesized to result in reading comprehension gains because the flowchart directed the readers' attention to relevant aspects of the text. The flowchart guided participants to engage with the text in a way that builds on their mental representation by having them think more critically about the text. After completing each story, participants responded to comprehension questions based on the text in which they were engaging with a critical lens. Furthermore, by following the recommended pathways, the readers were expected to demonstrate comprehension gains. In addition, the readers had access to the flowchart throughout the reading comprehension task and while answering the questions. Participants were randomly assigned to the intervention group or the control group. Those in the intervention group were exposed to an intervention that included a pre-constructed strategy flowchart. Bilingual participants were taught how to use the flowchart and then practiced independently employing the strategies during their think-aloud responses. Reading comprehension was assessed at pre- and post-test to determine whether the flowchart impacted comprehension success.

Finally, Chapter 5 summarizes the work completed within this dissertation and how each study builds on the previous one. It explains how the work may contribute to

future research within the field of bilingual reading comprehension and guided strategy recruitment. Implications for bilingual readers and second-language educators are discussed within this section of the dissertation. Next steps are outlined within Chapter 5 with the hopes of expanding on this current study and developing new methods of assessing bilinguals' reading comprehension gains using a flowchart intervention tool.

The importance of this dissertation is the knowledge gained about strategy recruitment in concert rather than in isolation amongst bilingual readers. With this knowledge in mind, a flowchart was created for guided strategy recruitment. This research investigated whether a guided flowchart reading strategy intervention improves reading comprehension after a single session. In addition, this research explored participants' ability to adopt the strategies outlined in the flowchart during their think-aloud protocols. Pre- and post-test measures are important in these studies to explore direct benefits of patterned strategy use and guided strategy use.

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2 Chapter Two: An Investigation of Reading Strategy Patterns Used by Bilingual Adults and Children

With the rise in bilingualism, many individuals communicate in more than one language on a daily basis. According to Statistics Canada (2017), between 2011 and 2016, English-French bilingualism rose from 17.5% to 17.9%, producing the highest proportion of English-French bilingualism in Canadian history. Likewise, Barrera and Bauer (2003) determined that bilinguals worldwide outnumber monolinguals, making bilinguals the norm rather than the exception (Ramirez & Kuhl, 2016). However, based on their language learning context, bilinguals can differ in their language proficiency profiles (Bialystok, 1991). Here we focus on English-French bilinguals in an Anglophone community who were learning French in an additive context, meaning that French was learned as their second language (L2) in a school context with little detriment to their first language (L1) development (Swain & Lapkin, 1991). Bilinguals from this population tend to be poorer readers in their L2 than in their L1 and tend to be more motivated to communicate in their L1 (Cummins, 2014; Lin et al., 2012). Developing skilled reading comprehension in both languages is necessary to effectively operate in each language.

Reading comprehension performance relies on the ability to employ effective strategies. Afflerbach, et al. (2008) defined a “strategy” as a systematic plan, consciously adapted and monitored, to improve one’s performance in learning. Past research has found that individual reading strategy use can explain successful reading comprehension in both one’s L1 and L2 (e.g., Estacio, 2013; Frid & Friesen, 2020; Jiménez et al., 1996; Muijselaar et al., 2017; Pressley & Afflerbach, 1995). Nonetheless, the pattern of strategy recruitment for both skilled and poor readers in their L1 and L2 has yet to be investigated. We define the pattern of strategy recruitment as the manner in which

individuals employ strategies together, regardless of the order of recruitment. Since readers rarely use strategies in isolation, it is important for reading strategy instruction to have a better understanding of how strategies work in concert with each other to promote successful comprehension. This current study examined the pattern of strategy selection that contribute to both successful and poor reading comprehension in L1 and L2 reading for both adult and child readers.

Models of reading comprehension (e.g., Kintsch's Construction-Integration model, 1988; 2005; Gernsbacher et al.'s Structure Building Model, 1990) describe how readers create a mental representation of the text. A consistent feature in these models is that readers must isolate meaning, connect meaning units to each other (i.e., creating a textbase), and integrate text knowledge with previous knowledge (i.e., creating a situation model). Different models emphasize different components in the construction of a text representation. Here we focus on perspectives where readers must engage strategic processing (e.g., allocating attention). For example, the Event-Indexing model focuses on the type of information that readers preferentially attend to by isolating five critical dimensions within a text (i.e., time, space, causation, intentionality and protagonist) (Zwaan et al., 1995; 1998). Dimensions become more interconnected in the mental representation when they relate to the same event (e.g., situating a protagonist in a location). Importantly, readers must update these dimensions as the narrative unfolds to create coherence.

Graesser et al. (1994) also highlight the importance of how readers selectively attend to different aspects of the text and update information. Specifically, readers choose to attend to particular aspects of a text based on their *reading goals*. For instance, baking

a cake requires close attention to details; whereas attention to details might not be necessary for poetry to evoke a mood. Importantly, Graesser et al. argue that to form *coherence*, readers attempt to connect different units of selected meaning to form a cohesive understanding. Readers also generate *explanations* of why events and actions occur in a text. Skilled readers will likely use coherence strategies such as necessary inferencing and summarizing to gain a meaning-based representation of a text (Grabe, 2009; Huang, 2018). Additionally, skilled readers will likely use explanation strategies such as questioning, predicting and background knowledge that require extrapolation beyond the text (Block, 1986; McNamara, 2012).

In their framework, Gernsbacher et al. (1990) were more specific on how readers build a mental structure within which information is consolidated in memory. In the Structure Building framework, readers must lay a foundation with initial information, then relate incoming information to previous information, and shift to a new substructure if the incoming information is inconsistent with already existing structures. Laying the foundation occurs both with the incoming information from the text and from previous knowledge that is activated by the text (i.e., referred to as memory cells or nodes). These memory cells or nodes are background knowledge and can be activated by incoming stimuli. As new information is added, node activation can either be enhanced or suppressed. Here readers may spend more time reading the first few sentences of a text in order to generate the initial structure. Likewise, when information is inconsistent with the already existing structure, more time is needed to create a new substructure. Deploying effective strategies (like reliance on text structure) during these construction and integration processes should facilitate creating a text representation.

The majority of research on reading comprehension has focused on specific strategies (e.g., visualizing) that individuals recruit while reading for understanding (e.g., Muijselaar et al., 2017; Spörer et al., 2009; Spörer & Shunemann, 2014). Recruitment of individual reading strategies is a strong predictor of reading comprehension success (Cain et al., 2001; Griva et al., 2009; Wang, 2016). For instance, O'Brien et al. (1988) noted that *elaborative inferences* assist with after-the-fact reading comprehension. With respect to *predicting*, Duke and Pearson (2009) identified that skilled readers make predictions about upcoming events. Skilled readers also *visualize*, which allows them to create a visuospatial mental representation (De Koning & van der Schoot, 2013). Likewise, readers with *text structure* awareness are able to anticipate upcoming information and can insert content into a pre-generated scaffold or structure (Gernsbacher et al., 1990; Meyer et al., 1980; RAND Reading Study Group, 2002). Of note however, each of these studies examined how *individual* strategies are associated with a reader's comprehension, rather than patterns of strategy use.

Research using think-aloud procedures enables us to examine the type of strategies individuals use together during reading for meaning. In a think-aloud procedure, the reader discusses their thoughts during an online reading task, enabling a real-time account (Lytle, 1982). Think-aloud research has explored the strategies used by both successful and less successful readers (Griva et al., 2009; Wang, 2016). Nonetheless, Leow and Morgan-Short (2004) note that thinking aloud may change readers' cognitive processing during reading. Therefore, it is important to note that a think-aloud reflects the conscious processes generated based on the task demands but

may not reflect cognitive processes that occur during natural reading or processes that are beyond the reader's awareness.

Nevertheless, the think-aloud procedure is a more refined methodology than the use of self-reporting (Lin & Yu, 2015) and can capture processing in real time. For example, Griva et al. (2009) asked English as a foreign language (EFL) students in grades four to six to complete think-aloud responses to two English texts. Skilled readers used a wider range of strategies and recruited more metacognitive strategies (e.g., monitoring understanding, questioning & predicting) than less successful readers. Older readers were able to combine cognitive strategies (e.g., translating, inferencing, summarizing, and using prior knowledge) and metacognitive strategies in their think-aloud responses. However, this study did not examine the manner in which these strategies work together to impact reading comprehension success.

Wang (2016) also examined reading strategy use and comprehension performance in EFL readers. First-year high school Chinese/English bilingual students read four English texts, completed think-aloud responses, and answered reading comprehension questions. Results revealed that stronger readers recruited multiple strategies (e.g., predicting, inferencing, grasping meaning, recruiting background knowledge). They also monitored their comprehension and integrated textual information (i.e., word decoding, vocabulary knowledge). Less successful readers often misinterpreted information from the text and struggled to create a cohesive understanding. Such findings demonstrate clear differences in strategy recruitment from skilled and poor readers, but strategy use has yet to be investigated in both L1 and L2.

2.1 The Present Study

The current study examined how skilled and poor bilingual readers (children and adults) differ in their pattern of strategy use in both the L1 and L2. We use the terms “skilled and poor readers” because we have not identified in our poor reader samples whether reading difficulties arise from decoding or comprehension deficits. Here an in-depth analysis on a subset of previously collected think-aloud data (Frid & Friesen, 2020; Friesen & Frid, 2020) was undertaken. In both the adult and child dataset, think-alouds of bilinguals in the top and bottom quartile in either English or French were selected for further qualitative analysis of coded strategies. See Table 1 for the list of coded strategies.

Table 1
Reading strategies coded in think-aloud data (Blackowicz & Ogle, 2017; Coiro & Dobler, 2007)

Reading Strategy	Reading Strategy Description
Summarizing	Paraphrasing what was read
Necessary Inferencing	Reading “between the lines”
Elaborative Inferencing	Deducing information not found in the text but not required to understand the text
Predicting	Guessing what will happen next
Background Knowledge	Linking previous experiences to text content
Connecting	Linking previous text information to current information
Questioning	Asking questions about text content or form
Visualizing	Generating images of text content
Text Structure	Commenting on the genre features or sentence structure
Vocabulary	Commenting on vocabulary words

The original studies (Frid & Friesen, 2020; Friesen & Frid, 2020) used the complete datasets to investigate whether strategy recruitment predicted reading comprehension success in one’s L1 and L2 beyond what could be accounted for by language proficiency (e.g., vocabulary knowledge and word reading fluency). In both

studies, strategies that required text analysis and making meaning-based connections were unique predictors of successful reading comprehension in L1 and L2. However, these studies focused on quantity and type of strategy employed rather than the quality of strategy use and the relationship between strategies within a think-aloud. A focus on the latter enables recommendations on how to effectively combine reading strategies.

This current research addressed three research questions: (1) Does the pattern of strategy use differ between skilled readers and poor readers? (2) Does the pattern of strategy use differ between children and adults within each reader ability group? (3) Does language (L1 vs. L2) impact the results? It was hypothesized that skilled readers would recruit more strategies and more varied strategies than poor readers. Adults were expected to demonstrate more varied strategy use than children. Additionally, since the adults were a homogeneous sample of university students, differences between skilled and poor readers were expected to be larger in the children. Lastly, more varied strategy recruitment was expected in bilinguals' dominant language, English.

2.2 Method

2.2.1 Participants

Seventeen adults ($M_{age} = 24.4$ years, $SD_{age} = 6.4$, 14 females) and 17 children ($M_{age} = 9.6$ years, $SD_{age} = 0.8$, 10 females) were included in this study. All participants considered English their L1 and their dominant language with one participant who reported that English and French were learned simultaneously. Adults were either enrolled in a pre-service teacher education program to be French Immersion teachers or were completing an undergraduate degree in French. Adults reported that they started learning French at 6.4 years old on average ($SD = 3.0$) in school. They reported that they currently read in French an average of 18.9 % ($SD = 14.6$) per week and in English an

average of 80.5% ($SD = 15.2$) per week (the remaining percentage dedicated to a third language). Eleven adults completed French immersion education at an average of 5.3 years ($SD = 5.1$). Children were fourth- and fifth-grade students enrolled in French Immersion at 5.2 years of age on average ($SD = 0.8$). Their parents reported that they read in French 2 hours per week on average ($SD = 0.8$) outside of school and they read in English 5.7 hours per week on average ($SD = 3.9$). These participants were selected from two larger datasets that consisted of 39 adults (Friesen & Frid, 2020) and 70 children (Frid & Friesen, 2020). See below for selection criteria.

2.2.2 Tasks

All participants completed three language tasks in both English and French. The Peabody Picture Vocabulary Test (PPVT-III; Dunn & Dunn, 1997) measures receptive vocabulary. Participants heard a word and picked the image that best matches the word from four images. Form A was administered in English and Form B was translated into French. The Test of Word Reading Efficiency (TOWRE; Torgesen et al., 1999) measures word and non-word reading fluency. Participants read a list of real words and pseudo-words as quickly and as accurately as possible in two separate 45-second trials. The French version was created by Jared et al. (2011). Total number correct was calculated for each task.

For the reading comprehension task, some texts from the Gray Oral Reading Test (GORT, Wiederholt & Bryant, 2001) were selected; Form A was translated into French and Form B was used in English. Participants read texts two sentences at a time on the computer screen, then hit a spacebar to complete their think-aloud in response to a cuing beep. When done, they hit the spacebar to advance to the next sentences. Previously revealed sentences remained until the entire text was uncovered. Participants did four

think-alouds per text and were given a strategy prompt sheet with sentence starters (i.e., “I picture...”, “I predict that...”, etc.) to use as needed. After each story, they answered three open-ended questions that were written for this task. Participants did not have access to the text when completing the comprehension questions. Questions were scored out of two (i.e., zero being incorrect, one being partially correct, and two being completely correct).

2.2.3 Participant selection & data analysis

Eight groups were created by selecting five participants by examining the top and bottom quartiles of reading comprehension scores in English and French in both the adult (Friesen & Frid, 2020) and child (Frid & Friesen, 2020) datasets. Reading comprehension scores were examined across all stories (i.e., 12 stories for adults and 8 stories for children) to get a sense of the readers’ comprehension ability. The highest scorers within the top quartiles and lowest scorers in the bottom quartiles were selected to examine the strategy use of both skilled and poor performers on the RC task. This procedure resulted in 40 think-aloud sets to analyze qualitatively. For example, five participants’ think-alouds represented the Adult English Skilled Readers group. Some readers were top or bottom scorers in both languages and thus had think-alouds represented in two groups. See Table 2 for scores on language measures as a function of age, reading skill and language. As a point of comparison, Table 2 reports mean scores for the complete datasets.

Table 2
Language measures (means and standard deviations) as a function of age, reading skill and language

	Adults		Children	
	English	French	English	French
<u>Skilled Readers (N = 5)</u>				
Reading Comprehension (max. 12)	10.6 (0.5)	10.4 (0.9)	9.8 (1.5)	9.0 (1.4)
PPVT (max 204) ¹	186.8 (4.5)	176.6 (12.6)	158.2 (19.0)	114.4 (40.6)
TOWRE Words (max. 104) ²	98.6 (9.9)	92.0 (6.6)	71.6 (12.0)	67.0 (8.5)
TOWRE Non-Words (max. 63) ²	55.4 (6.3)	55.6 (4.7)	40.2 (11.9)	41.2 (9.3)
<u>Poor Readers (N = 5)</u>				
Reading Comprehension (max. 12)	7.4 (1.3)	4.2 (0.8)	3.4 (0.9)	0.0 (0.0)
PPVT (max 204) ¹	179.2 (7.2)	154.8 (11.6)	131.4 (19.2)	91.2 (33.5)
TOWRE Words (max. 104) ²	94.2 (9.1)	83.0 (14.3)	60.6 (16.0)	37.6 (3.9)
TOWRE Non-Words (max. 63) ²	48.6 (9.4)	48.8 (13.6)	27.0 (14.6)	21.0 (10.1)
<u>All Readers³</u>				
Reading Comprehension (max. 12)	8.6 (1.8)	7.2 (2.4)	6.4 (2.0)	3.0 (2.6)
PPVT (max 204) ¹	181.7 (6.1)	168.9 (16.7)	144.2 (17.3)	90.7 (30.4)
TOWRE Words (max. 104) ²	95.3 (10.7)	86.8 (12.6)	67.4 (10.3)	53.9 (11.8)
TOWRE Non-Words (max. 63) ²	52.1 (7.6)	54.6 (8.4)	32.6 (10.4)	31.2 (11.0)

Notes. 1. PPVT: Peabody Picture Vocabulary Test; 2. TOWRE: Test of Word Reading Efficiency; 3. Adults (N = 39), Children (N = 66)

The coded think-aloud responses were taken directly from the original datasets. These think-alouds had been transcribed and coded for 10 strategy categories (see Table 1). Inter-rater reliability had been calculated on a subset of think-alouds for each dataset with agreement at or above 80% for each sample. However, all think-alouds had been examined by two coders and final agreement was reached on all codes. Here we restrict our analysis to the two texts in each language that both age groups completed to compare

the groups directly.¹ In the quantitative analyses, the total number of strategies employed was calculated for each participant and averaged across the two texts in each language. Varied strategy use was defined as the number of different strategies that participants used. This value was also averaged across the two texts in each language. In the qualitative analyses, the relative use of each strategy and how strategies were used together in think-aloud responses were analyzed separately for each age group as a function of skill and language (e.g., skilled adult English readers). Adult codes began with the letter “A” (e.g., AXXX) and child codes began with the letter “C”. For example, the first adult participant tested was named A101 and the fourth child participant tested was C104. Participants were identified using three-digits to distinguish these participants from those in Frid and Friesen’s (2020) study and Friesen and Frid’s (2021) study.

2.3 Results

Table 3 reports the means and standard deviations of total strategies and varied strategy use as a function of reader skill (skilled vs. poor), age (adults vs. children) and language (English vs. French). 2 x 2 x 2 Factorial analysis of variance (ANOVA) tests were conducted on total number of strategies and varied strategy use with age, reader skill and text language as between-group independent variables. Shapiro-Wilks analyses confirmed the normality of each group’s distribution on both dependent variables, all $ps > .08$. Likewise, Levene’s tests confirmed homogeneity of variances for both dependent measures, all $ps > .31$, meaning that the assumptions of ANOVA were met.

In the total strategies measure, there was a main effect of age, $F(1, 32) = 89.99, p < .001, \eta_p^2 = .74$; adults used more strategies than children. The main effect of reader skill, $F(1, 32) = 41.56, p < .001, \eta_p^2 = .57$, indicated that skilled readers used more strategies than poor readers. The main effect of language was not significant, $F(1, 32) =$

2.84, $p = .10$, $n_p^2 = .08$, nor were the interactions of age and reader skill, $F < 1$, age and language, $F < 1$, and skill and language, $F(1, 32) = 1.84$, $p = .19$, $n_p^2 = .05$. The three-way interaction of age, reader skill and language was also not significant, $F(1, 32) = 2.31$, $p = .13$, $n_p^2 = .07$. In the varied strategy use measure, there was also a main effect of age, $F(1, 32) = 25.79$, $p < .001$, $n_p^2 = .45$, and a main effect of reader skill, $F(1, 32) = 11.14$, $p = .002$, $n_p^2 = .26$. Adults had more varied strategy use than children and skilled readers had more varied use than poor readers. There was no main effect of language, $F < 1$, no age by skill interaction, $F < 1$, age by language interaction, $F < 1$, skill by language interaction, $F(1, 32) = 1.03$, $p = .32$, $n_p^2 = .03$, or a three-way interaction, $F < 1$. Follow-up analyses confirmed that the same significant results were observed when each text was analyzed separately, indicating that the effects generalized across material and were not driven by a single text.

Table 3
Means and standard deviations of total strategies used and varied strategies used as a function of age and reading skill and language

	Skilled Readers						Poor Readers					
	Adults		Children		Mean		Adults		Children		Mean	
	N=10		N=10				N=10		N=10			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Total Strategies												
English	15.2	17.3	7.9	1.9	10.7	3.4	10.2	13.1	4.4	2.2	7.6	3.7
French	13.5	14.9	6.9	2.9	10.5	4.3	7.7	11.1	3.6	0.8	5.7	2.7
Varied Strategies												
English	4.9	1.0	3.2	1.0	4.1	1.3	4.0	0.8	2.5	0.9	3.3	1.1
French	5.1	1.0	3.2	1.4	4.2	1.5	3.6	1.6	1.7	0.8	2.7	1.5

Tables 4 and 5 report the sums of each strategy (collapsed across texts) for each participant as a function of age and reader skill in English and French respectively. In each table, the proportion of use for each strategy within each group is reported.

Proportion was calculated by dividing the sum of a particular strategy by the total strategies used by that reader group. Proportion allows us to examine the relative use of each strategy within each group and make direct comparisons to other groups. In the next section, we analyze both 1) the distribution of strategy recruitment within each group in terms of proportion to reveal general trends and 2) the patterns of strategic behaviours within each think-aloud to understand how strategies are used together. This information will be presented by group (i.e., skill level, age and language).

Table 4*The sum of strategies recruited in English as a function of age and reading skill*

Participants	Strategies										
	Summary	Nec. Infer.	Elab. Infer.	Prediction	Question	Visualizing	Back. Know.	Vocab	Connect	Text	Total
Adults											
Skilled Readers											
A108	6	7	8	4	0	0	1	0	2	0	28
A107	12	12	11	0	0	1	0	0	2	2	40
A111	10	8	9	1	1	0	1	0	0	2	32
A112	7	2	5	3	0	0	2	0	1	4	24
A110	8	7	7	1	0	0	4	0	1	0	28
Proportion Use	0.28	0.24	0.26	0.06	0.01	0.01	0.05	0.00	0.04	0.05	
Poor Readers											
A101	11	9	1	0	0	0	0	0	0	2	23
A103	3	5	5	0	0	3	3	0	1	2	22
A104	5	4	3	3	0	0	0	0	0	0	15
A106	5	13	1	0	0	0	0	0	0	1	20
A113	7	6	1	0	0	1	2	0	1	4	22
Proportion Use	0.30	0.36	0.11	0.03	0.00	0.04	0.05	0.00	0.02	0.09	
Children											
Skilled Readers											
C101	2	4	2	0	1	0	4	0	0	0	13
C107	4	12	0	0	0	1	0	0	0	0	17
C108	0	0	7	0	0	0	6	0	0	0	13
C109	1	6	0	3	0	0	4	0	0	0	14
C116	13	5	3	0	0	0	1	0	0	0	22
Proportion Use	0.26	0.34	0.15	0.04	0.01	0.01	0.19	0.00	0.00	0.00	
Poor Readers											
C102	1	0	2	0	3	0	0	0	0	0	6
C104	0	3	0	5	0	1	0	0	0	0	9

C105	1	7	4	1	0	3	0	0	0	0	16
C111	0	3	1	1	0	0	0	0	0	0	5
C115	0	0	0	1	0	0	7	0	0	0	8
Proportion Use	0.04	0.30	0.16	0.18	0.07	0.09	0.16	0.00	0.00	0.00	

C111	6	0	1	0	0	0	0	2	0	0	9
C114	3	0	2	0	0	0	0	2	0	0	5
C117	8	0	0	0	0	0	0	0	0	0	8
Prop. Use¹	0.78	0.00	0.08	0.00	0.05	0.03	0.00	0.11	0.00	0.00	

1. Prop. Use refers to the proportion used, which is calculated by dividing the sum of a particular strategy by the total strategies used by that reader group

2.3.1 Skilled adult English readers

Although skilled adult English readers showed the most varied strategy use, 78% of their strategy use was the combination of summarizing, necessary inferences and elaborative inferences. For these three strategies, no single individual was over-represented. For example, summarizing was equally distributed across participants to make up 31% of the total strategies recruited. This equal use of the strategy across participants was also observed for both necessary and elaborative inferencing. These findings suggest that this group was fairly homogeneous in its strategic behaviour.

Within individual think-aloud responses, skilled adult readers recruited multiple strategies. Moreover, they recruited both elaborative strategies and meaning-based strategies. Participant A111 read a story about Harriet Tubman and said: “They obviously knew what her impact was because there was a reward out for her”. This reader made a necessary inference (i.e., knew what her impact was) and linked it with meaning-based information from the text (i.e., there was a reward). Skilled English readers also made predictions and some readers later made connections. For example, A110 read a story about farmers and they stated: “It’s talking about the difficulties of farmers.... It probably might have something to do with pesticides and using pesticides”. They start with a summary (i.e., difficulties of farmers) and follow it with a prediction (i.e., it might have something to do with pesticides). In the following think-aloud, A110 expressed: “Just like I predicted, they’re talking about using chemicals/pesticides to protect the food”.

2.3.2 Poor adult English readers

Similar to the skilled adult readers, summarizing, necessary inferencing and elaborative inferencing accounted for 84% of the strategies recruited. However, this

group was more heterogeneous in their recruitment of strategies. For example, 39% of the observations in summarizing were contributed by A116, 33% of the observations in necessary inferencing were contributed by A106, and 45% of the observations in elaborative inferencing were contributed by A103. Note equal contribution would be 20% per participant. An examination of Table 4 suggests that these individuals tended to persevere on a particular strategy. For example, A116 read the farmer story and recruited meaning-based strategies only (i.e., summaries and necessary inferences). In most cases, their summarizations were repetitions of what was described in the text. Thus, within think-alouds, these individuals did not recruit many different strategies. Participant A101 read a story about farmers and made a questioning prediction, “I am wondering if at the end [of the story] they will give a solution to these problems”. Their following think-alouds did not address this prediction again.

2.3.3 Skilled adult French readers

Participants recruited mostly summaries (i.e., 29%), necessary inferences (i.e., 19%) and elaborative inferences (i.e., 21%), which totaled 69% of their behaviours. Use of these strategies was somewhat equally distributed across participants, the exception being elaborative inferencing, which seemed to be driven by a single individual (i.e., 45% of elaborative inferences were contributed by A102). Yet, participants did comment on vocabulary (11%) and made reference to background knowledge (8%).

Skilled adult French readers tended to recruit various strategies in a single think-aloud. For example, A109 read a story about cowboys and stated: “It talks about the migration towards the north. It was because of economic development. It was first in the south, then in Arizona...” A109 started with a necessary inference (i.e., migration toward the north), followed by an elaborative inference (i.e., economic development) and

reference to background knowledge (i.e., Arizona). Skilled readers also made direct links between their meaning-based strategies and their more elaborative strategies by using “because” to connect ideas. For example, A114 explained that the cowboys were nervous (elaborative inference) about the train because they would not have a job (necessary inference). These readers also confirmed or disconfirmed predictions. Participant A114 read a story about Caesar Chavez and expressed, “The name Caesar Chavez makes me think of someone, but I don’t know if I’m thinking of the right person. I think that the story will be about Chavez creating a union in the United States, in California”. A114 starts with recruiting their background-related knowledge about Chavez, followed by a prediction. The subsequent think-aloud was, “Yes! It is the man that I was thinking of. He doesn’t have a lot of education and I still predict that he will create a union”. Referring to earlier content shows that the reader is creating coherence to understand the text.

2.3.4 Poor adult French readers

Participants appeared to favour summarizing the most in this group (47%). For example, A105 tended to only summarize and made one or two summaries in each think-aloud. In addition, some of participants’ summaries were incorrect. For example, A101 incorrectly noted that, “Caesar Chavez gave many comments to the other workers”. The proportions in the low-use strategies were driven by three participants (i.e., A115 asked 6 questions, A101 made 4 elaborative inferences, A115 commented on vocabulary 4 times). Such findings suggest that, in addition to summarizing, readers favoured different strategies.

2.3.5 Skilled child English readers

This group favoured summarizing, necessary inferencing and background knowledge (totaling 79% of strategies). Two participants impacted the proportions of

summarizing and necessary inferencing (i.e., 65% of summaries were recruited by C116 and 44% of necessary inferences by C107). Background knowledge accounted for 19% of strategies; many children discussed learning about Harriet Tubman in school or learning about farming from a relative.

Within responses, individuals tended to recruit both elaborative strategies and meaning-based information. For example, Participant C116 stated about Harriet Tubman: “I think Harriet is really brave because she says that she never lost a passenger, which must mean that she kept the slaves really safe”. This example shows an elaborative inference (i.e., I think Harriet is really brave), followed by a summary (i.e., she says that she never lost a passenger), and then a necessary inference (i.e., she kept the slaves really safe).

2.3.6 Poor child English readers

Overall, this group did not show much strategy use, including summarizing. Although necessary inferencing was recruited the most, the think-alouds revealed that many of the inferences were incorrect. Participant C105 stated, “I think [Harriet Tubman] was rewarded a big portion of money for freeing hundreds of people”. This was an incorrect necessary inference since the reward was for capturing Harriet Tubman. Additionally, there was no single prototypical profile for the poor readers, but rather readers tended to select a strategy or two and persevere on them. Participant C104 made a single prediction in each of their responses without recruiting any other strategy. For example, when referring to farmers, they said: “I predict that they are going to use the chemicals to get the insects out and grow new crops” and “I predict that in a few months, their crops will get destroyed”. Likewise, C115 primarily referred to background knowledge without linking it to units of meaning from the text.

2.3.7 Skilled child French readers

This group primarily summarized (38%) and commented on vocabulary (29%). Furthermore, it appeared as though two participants contributed substantially to these values (i.e., 42% of the observations in summarizing were contributed by C103, and 60% in vocabulary were contributed by C113). Still, there was a lot of summarizing being recruited by other children within the sample as well. In general, few individuals used more elaborative strategies (i.e., 7% for predicting, 6% for questioning). Nonetheless, individuals who used these strategies tended to recruit them in conjunction with meaning-based strategies. For example, C109 said about Caesar Chavez: “It is not good for a child to go to 37 schools because he won’t be able to finish projects and he won’t be able to learn [very much] if he continues to [switch schools]”. Contained within this think-aloud is a necessary inference (it is not good) and a prediction. Furthermore, this individual explains why attending 37 schools would be worrisome.

2.3.8 Poor child French readers

This group predominantly perseverated on summarizing texts (78%) and in general they neglected to use any other strategies. There were a few instances of other strategies such as elaborative inferences and reference to vocabulary. However, these individuals often made single statements without expanding beyond the text. Many think-alouds involved restating the text rather than paraphrasing. For example, C111 commented about the cowboy text: “the cowboys are becoming less important”. This phrase was found directly in the text. These restatements made it unclear whether participants understood the texts.

2.4 Discussion

The current research examined the nature of differences in reading strategy recruitment between skilled and poor readers when reading in L1 and L2 for both adults and children. As expected, adults showed more strategies and more varied strategy recruitment than children in both L1 and L2. Additionally, skilled readers recruited more strategies than poor readers in both languages. Such findings are consistent with research that reports that skilled readers were those individuals who utilize extensive sets of strategies (e.g., Uhl-Chamot & El-Dinary, 1999; Wang, 2016). Interestingly, there were no significant interactions between age and reader skill, suggesting that the recruitment differences in quantity between skilled and poor readers was similar in both the adult and child groups. However, the nature and quality of the individual think-alouds differed as a function of age, reader skill and language.

2.4.1 Patterns of strategy recruitment

2.4.1.1 Pairing meaning-based strategies with complex, background-related strategies

Generally, all readers relied on summarizing and recruiting necessary inferences. These strategies can enable readers to grasp the meaning of a text without extrapolating much beyond the presented information. Summarizing is an important strategy to recruit while reading, especially in younger readers, since it allows the reader to identify and potentially encode units of meaning. A strong reliance on strategies that extract meaning from print is consistent with Zwaan et al.'s (1995; 1998) emphasis on the need to identify important dimensions of the text (e.g., time and space) when developing a mental text representation.

While most readers engaged in core strategies, skilled readers tended to combine these meaning-based strategies with more elaborative background-related strategies (e.g., predicting, elaborative inferencing) within a single think-aloud response. For example, skilled readers would identify a unit of meaning in a summary statement and then use this information as the foundation for an elaborative inference or a prediction. Allbritton (2004) noted that combining predictions with inferencing allows readers to construct a rich understanding of the text. This strategy combination shows that readers are able to utilize explicit details to extrapolate beyond the text and draw conclusions.

Using background information also distinguished skilled readers from poor readers. Fourteen of the skilled readers made at least one reference to background knowledge compared to four poor readers. These skilled readers were able to link their background knowledge to relevant information in the text and make reasonable inferences. Pressley (2000) reported that good readers tend to incorporate background knowledge to make elaborative inferences and that those individuals with rich background knowledge are more likely to make sound inferences. Of note, the current research did not expressly assess participants' level of background knowledge. However, participants were drawn from the same populations (e.g., all children had Harriet Tubman in the school curriculum), yet only the skilled readers were able to consistently utilize this information in their text representation.

Another behaviour that distinguished skilled readers from poor readers was using "because statements" to connect meaning-based strategies to more complex strategies. These "because statements" are important because they demonstrate readers' awareness of how the text itself is linked to their generated ideas. Using the word "because" is a

connective term that allows the reader to provide reasoning behind their thought process (Schnieder, 2015). “Because statements” align with the principles of coherence and explanation (Graesser, 2007) because they demonstrate how a reader understands the text itself (coherence) and can generate explanations to outline relationships between units of meaning. If an individual is unable to discuss connections, it may be either because they were unable to make these connections themselves or because they were unable to articulate the connections. The think-aloud procedure does not enable us to readily differentiate between these two possibilities. However, providing both strategy prompt statements and allowing readers to respond in the language of their choice facilitates readers’ ability to express their ideas as much as possible, suggesting the more likely scenario was that poor readers were unable to make these connections.

Evidence that readers are combining meaning-based strategies with more elaborative strategies to comprehend texts is consistent with the creation of substructures or mental models proposed by Gernsbacher et al. (1990). Specifically, readers may be activating memory cells or nodes from previous knowledge and using them as part of a memory structure combined with other incoming information. Here, we see clear evidence of skilled readers generating summaries and inferences to form a meaning-based representation of a text and engaging background knowledge and elaborative inferences to connect new knowledge with pre-existing knowledge.

2.4.1.2 Comprehension monitoring

Comprehension monitoring was an important behaviour that distinguished skilled readers from poor readers in both languages. Skilled adult readers’ comprehension monitoring typically took form as connecting between past and current think-aloud responses as well as attempting to ascertain the meaning of unfamiliar French

vocabulary. Poor readers did not typically re-address their thoughts, and when they commented on unfamiliar French vocabulary, they usually did so without assessing whether the context could provide clues to meaning. An individual's ability to refer to previous think-alouds demonstrates that they can connect different text components to create a cohesive text representation (Janzen, 2002). Those who did not make connections may have not linked old and new information together, and as a result, they were not updating or enhancing old information. Perseverating on outdated information is unlikely to support reading comprehension success (Gernsbacher et al. 1990; Kendeou et al., 2017; Zwaan et al., 1995).

Relatedly, skilled L2 readers tended to update their vocabulary knowledge when additional information was presented. Since French was the language in which the readers were less proficient, they were less familiar with L2 words than L1 vocabulary. Evidence that the more skilled L2 readers are more likely to comment on vocabulary is consistent with results reported by Jimenez et al. (1996) and Griva et al. (2009) who noted that skilled readers attempted to determine the meaning of unknown vocabulary. In contrast, English vocabulary was never discussed by any readers likely because vocabulary did not interfere with text understanding to the same degree. Many readers may also have the illusion of comprehension when reading because they settle on shallow understanding for comprehension (Graesser, 2007).

2.4.1.3 Language proficiency

Effective strategy use is not the sole determinant of successful reading comprehension. Certainly, language proficiency in terms of both language knowledge (e.g., vocabulary, syntax) and decoding ability also underlie reading comprehension success (Gough & Tunmer, 1986; Scarborough, 2001). Work with the larger datasets

revealed that both language proficiency and strategy use uniquely predicted reading comprehension success (Frid & Friesen, 2020; Friesen & Frid, 2020). In our groups, differences existed in vocabulary knowledge and word reading fluency; in general scores were higher for skilled readers, for adults and when reading in L1. These differences in foundational reading skills must be taken into account in our interpretations of effective strategy use. Importantly, it appears that a minimum degree of language proficiency is necessary to engage strategies effectively but having that proficiency does not necessarily mean readers will utilize effective strategies (Cummins, 2014).

Supporting this contention, language ability (both vocabulary and decoding skills) was not the limiting factor for adult readers, particularly in L1. For example, all adult English readers had high levels of English knowledge and the two texts were selected to be accessible to students in grade 4. Yet both the skilled adult readers and the skilled child readers outscored the poor adult readers on reading comprehension (in both English and French), despite the fact that the skilled children had lower vocabulary and word reading fluency scores than the poor adult readers. These results suggest that it was ineffective strategy use that negatively impacted the poor adult readers' comprehension and not their language knowledge. Interestingly, poor adult readers understood the English texts because they produced very few incorrect statements. However, these readers' strategies were different from those of skilled readers. For these poor readers, perseverating on single strategies within single think-alouds likely resulted in less cohesive and comprehensive text representations from which to draw answers for the comprehension questions. In contrast, adult skilled readers had the trifecta of high vocabulary knowledge, good word reading fluency and effective strategy recruitment in

both L1 and L2. Indeed, there was very little that distinguished strategy use in each language for skilled adult readers.

Of note, the child data demonstrates that effective strategy use can offset less language knowledge. Although the skilled child readers had language scores and were using fewer strategies overall than their adult skilled counterparts, their reading comprehension scores differed by only a single point. These readers were engaging in meaning-making strategies and linking them to more elaborative strategies. Interestingly, even though skilled English children identified on average 40 more vocabulary words than the French skilled readers, there was very little difference in their comprehension scores, again suggesting that effective strategy use can facilitate understanding. Previous research has certainly proposed that successful strategic reading may support students' comprehension when there is weaker language proficiency (Carrell et al., 1989; Kolic-Vehovec & Bajsanski, 2007).

Nonetheless, a minimum level of language proficiency is necessary to engage in effective strategy use. Specifically, the poor child readers in both English and French had very low mastery scores on the non-word reading fluency measure, suggesting that the majority of their attention during text processing was allocated to decoding words. Thus, it is not surprising that poor readers mistakenly paraphrased the text or drew improper inferences. They also perseverated on single strategies. In French, where vocabulary knowledge was also lower, poor readers tended to perseverate on summarizing. This finding was true of both adult and child poor French readers. Such findings suggest that, particularly in L2, comprehension breaks down during initial understanding rather than encoding or retrieval. Without an understanding of the text likely due to less language

knowledge, it is not surprising that readers cannot make sound inferences or use other elaborative strategies in their think-alouds (Jitendra & Gajria, 2011; Williams, 1998).

The results of the current study must be interpreted in light of its limitations. Our participants were selected based on their RC performance and were not matched on their language proficiency. Thus, differences between skill groups cannot be easily localized to deficits in comprehension skills (e.g., discourse skills, inference ability) or word identification difficulties. Future research should specifically examine the patterns of strategy use when skilled and poor comprehenders are matched on vocabulary knowledge and word reading fluency.

2.4.2 Implications for educators

Successful reading strategy recruitment is deliberate, conscious, effortful, time consuming, and important in text comprehension (Graesser, 2007). However, specific strategy recruitment patterns were outlined in this paper that distinguish successful readers from less successful readers. In general, recruiting meaning-based knowledge with complex, background-related strategies, connecting different parts of a text or thoughts, as well as varied strategy recruitment were shown to underlie skilled reading comprehension in L1 and L2 reading. Therefore, it is important that educators teach these strategies to young readers so that these strategies are internalized when reading for comprehension.

Educators can support their students' reading comprehension success by instructing them on effective methods of strategy recruitment. Duke and Pearson (2000) identified five components of successful strategy instruction that include (1) strategy description, (2) strategy modeling, (3) collaborative use, (4) guided practice, and (5) independent use. Next steps may include a reading strategy intervention that involves

these components. Campbell and Malicky (2002) noted that the purpose of strategy interventions is to influence readers to integrate reading strategies rather than rely on a single strategy. Previous research in strategy interventions have shown improvements in reading comprehension within adults (Karimi, 2015; Kern, 1989) as well as children (Cantrell et al., 2010; Spörer et al., 2009). The majority of strategy instruction programs have included the use of reciprocal teaching, which requires the teacher to model the target strategy and eventually encourage the student to practice using the strategy with some guidance (Palincsar, 1982). Ultimately, the goal of reciprocal teaching is for students to use the strategy effectively on their own (Duke & Pearson, 2002).

Reading strategies assist learners in organizing information in their mental text representations (Mayer, 1996). Similarly, flowcharting is a tool that assists readers in creating an external graphic representation of the content and/or structure of a text (Geva, 1980). Flowcharts can mimic the manner in which mental text representations are thought to be organized by allowing readers to insert content into a pre-set structure (Geva, 1983). Future research should examine how flowcharting can guide participants in using strategies in concert with each other. The roadmap could be modelled after effective strategy pairings observed in the current study such as using a “because statement”, connecting different parts of the text, and reinforcing the recruitment of varied strategies within a single think-aloud. These instructional pieces should encourage readers to use these specific strategy patterns associated with successful reading comprehension.

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2.6 Footnote

1. Adults read six texts in each language whereas children read three texts. Texts were selected with difficulty level in mind such that children were not given too difficult texts and adults were not given too easy texts, resulting in only two texts that overlapped between groups.

3 Chapter Three: Reading Strategy Intervention with Bilingual Adults

Many would argue that the purpose of reading is comprehension (Bojovic, 2010; Kirby, 2007). Reading comprehension is crucial in our day-to-day functioning. Without this ability, people would experience challenges communicating with others (Kucan & Beck, 1997) as well as pursuing an education or maintaining a job (McVay & Kane, 2012). However, it is important to recognize that readers may be required to read in non-native languages. For example, the English-French bilingualism rate in Canada increased to its highest proportion ever (17.9%) in 2016 (Statistics Canada, 2017). With this bilingualism increase, it is crucial to understand individuals' reading comprehension ability when reading in their dominant versus their non-dominant language. Previous research has demonstrated that bilingual readers typically process texts more effectively in their more proficient language relative to their non-dominant language (Proctor, Carlo, August, & Snow, 2005; van Steensel, Oostdam, van Gelderen & van Schooten, 2016). Importantly, then, it is necessary to find approaches to support reading comprehension development in both a bilingual's languages, particularly the non-dominant one.

To better understand this phenomenon, studies have investigated several factors that uniquely impact an individual's reading comprehension achievement such as word decoding ability, vocabulary knowledge and reading strategy recruitment (Muijselaar, Swart, Steenbeek-Planting, Droop, Verhoeven, & de Jong, 2017; Samuelstuen & Bråten, 2005). Our focus here is on strategy recruitment since research has demonstrated that there appears to be a benefit in recruiting specific strategies over others (Frid & Friesen, 2020; Friesen & Frid, 2021). Yet, reading strategy research typically examines readers' self-directed strategy recruitment, in other words, the mental processes that occur in a

reader's mind while reading. Nonetheless, instructing readers to recruit successful strategies while interacting with a text may lead to reading comprehension gains. The current study included a reading strategy intervention that teaches and guides bilingual adult readers' strategy recruitment. Ideally, prompted strategy recruitment results in greater reading comprehension success than unprompted strategy recruitment.

3.1 Reading Comprehension & Language Proficiency

According to the Simple View of Reading model (Gough & Tunmer, 1986), word decoding and linguistic comprehension are required for successful reading comprehension. Word decoding and language comprehension are the abilities to recognize words accurately and to do so quickly (Hoxha & Sumner, 2021), and they are strong predictors of reading comprehension performance (Cutting & Scarborough, 2006; Fuchs et al., 2001; Wanzek et al., 2010). Oral language skills (i.e., vocabulary) also support the development of reading ability (Hoxha & Sumner, 2021). Both receptive and expressive vocabulary have been associated with reading comprehension success (Foorman, Herrera, Petscher, Mitchell & Truckenmiller, 2015; Maier, Bohlmann & Palacios, 2016). Specifically, expressive vocabulary has been shown to associate with reading comprehension (Ricketts, Nation & Bishop, 2007; Senechal, Oullette & Rodney, 2006). Expressive vocabulary assesses the ability to recite information, including categories, definitions, comparisons and associations (Pratt, Peña & Bedore, 2021). Although reading decoding and language knowledge are two key features involved in reading comprehension, the metacognitive strategies readers engage with also uniquely impact reading comprehension. Previous research has demonstrated that reading strategies predict a person's ability to comprehend texts, above performance accounted for by linguistic ability (Frid & Friesen, 2020; Friesen & Frid, 2021).

3.2 Reading Strategy Recruitment

While reading, individuals recruit metacognitive strategies that assist in their understanding of a text. Reading strategies are cognitive aspects of information processing that require a systematic plan, consciously adapted and monitored, to improve one's performance (Afflerbach, Pearson & Paris, 2008). Blachowitz and Ogle (2017) outlined several strategies that individuals may employ depending on the text and purpose of their reading. To understand a text a number of strategies may be recruited, such as necessary/elaborative inferencing (i.e., reading between the lines), visualizing (i.e., picturing what is going on in one's mind), questioning (i.e., querying specific ideas/content) or summarizing (i.e., paraphrasing what is going on). In addition, individuals may reflect on their existing background knowledge to better connect with a text, consider the familiar/unfamiliar vocabulary presented or the manner in which the text is structured. The literature on reading comprehension and strategy recruitment have acknowledged these metacognitive approaches as the most common strategies used to comprehend texts (Vandergrift & Goh, 2012).

McNamara (2007) proposed three arguments that support the claim that reading strategies are important to develop skilled readers. Firstly, many readers are not aware of their comprehension ability, so the recruitment of strategies can help bolster their understanding. Secondly, many readers demonstrate a shallow level of understanding (i.e., word decoding, summarization), which means they are missing most of the underlying themes and messages presented. These readers may not be recruiting strategies to assist in deep understanding (i.e., inferencing, questioning). Lastly, many adults have difficulty understanding technical texts deeply. Therefore, metacognitive strategies are assistive in gaining a better understanding of challenging texts. According

to Friesen and Haigh (2018), the more skilled a reader is, the more strategic they can become in their recruitment of language comprehension knowledge.

To understand how certain strategies enable readers to be successful comprehenders, Graesser, Singer and Trabasco (1994) took a constructionist approach to identify three principles that readers tend to adhere to. Their approach recognized (a) reading goals, which is the information readers choose to attend to is dependent on the nature of their reading goals, (b) coherence, which states that the reader attempts to connect different units of meaning to construct meaning from the text, and (c) explanation, which states that good comprehenders think more critically about a text and generate explanations of why events and actions in the text occur. Relatedly, Kintsch (1988, 2005) proposed a model that describes the process of creating a text representation, which involves aspects of the constructionist approach (i.e., coherence and explanation). The Construction Integration (CI) model is comprised of three levels of text representation that are created while reading. The model includes (1) surface form – the literal wording of a text, (2) textbase – the meaning-based aspect of a text (i.e., main ideas or themes), and (3) situation model – the combination of the textbase with background knowledge. To produce these three levels of text representation, construction and integration processes take place. The construction process allows the reader to form the concepts that directly correspond to what is read, elaborate on the concepts by linking smaller units to the reader's background knowledge, infer certain pieces from the text, and assign connection strengths between the closely linked information. The integration process further refines the mental representation by dismissing irrelevant elements from

the text representation and focusing on the specific wording and knowledge-based elaborations (Kintsch, 1988).

When mapping reading strategies onto the CI model and constructionist principles, it is clear that the reader's goal is comprehension. Moreover, skilled readers will likely use coherence strategies such as inferencing and summarizing to gain a meaning-based representation of a text (i.e., textbase). Additionally, skilled readers will likely use explanation strategies such as questioning, predicting and background knowledge that require extrapolation beyond the text (i.e., situation model). Coherence and explanation can be linked to the construction process of the CI model because during this phase, the reader is making connections between their existing knowledge, which requires text comprehension and consolidation. The integration process may recruit background knowledge to eliminate irrelevant information and focus on the specific content that maps onto the readers' previous knowledge in order to create text consolidation. Furthermore, these theoretical perspectives provide an outlook that gives important weight on strategy use rather than focusing simply on language proficiency. In this current study, a flowchart intervention was employed with the purpose of guiding readers through the coherence phase of making connections between their existing knowledge (i.e., "because statements") as well as the integration phase of focusing on specific content in the text for memory consolidation to then answer the reading comprehension questions.

To analyze reading strategies, the majority of studies have incorporated think-aloud methods (Block, 1986; Frid & Friesen, 2020; Friesen & Frid, 2021; Uhl-Chamot & El-Dinary, 1999). Think-aloud responses are unique because they allow readers to

express what they are thinking about aloud while interacting with a text in real time (Uhl-Chamot, 2004). Think-aloud responses can also aid readers in building a mental representation of a text (Cote & Goldman, 1999; Ericsson & Simon, 1998). Overall, think-aloud protocols provide an informative glimpse of cognitive processing in progress (Jääskeläinen, 2010).

Work by Friesen and Frid (2021) provides insight into which strategies successful bilingual readers are employing through think-aloud methodology. Language proficiency measures and reading strategy recruitment were each predictors of reading comprehension success in English and French. Moreover, by grouping strategies together with a factor analysis, results revealed that text analysis strategies (i.e., text structure, vocabulary, connecting) and meaning extraction strategies (i.e., necessary/elaborative inferencing) each uniquely predicted reading comprehension success. In a follow-up study, Frid and Friesen (2021; chapter 2 here) demonstrated that concurrent strategy recruitment distinguished skilled comprehenders from poor comprehenders. Skilled bilingual readers employ specific strategies together, which may have elicited more successful comprehension. Specifically, skilled readers (a) recruited varied strategies rather than perseverating on a single strategy, (b) paired meaning-based strategies (i.e., summarizing, necessary inferencing) with elaborative strategies (i.e., elaborative inferencing, predicting) to maintain a deep understanding of the text, and (c) connected their think-alouds while reading through the texts to monitor their comprehension (i.e., I predicted _____ earlier and I still predict _____). The findings demonstrate that particular reading behaviours are associated with one's reading comprehension success. However, causation could not be inferred.

Additionally, participants were responding to a variety of reading comprehension questions that require literal knowledge or inferential knowledge (i.e., necessary inferencing or elaborative inferencing). Studies have found that different strategies are associated with different types of questions (Geiger & Millis, 2004; Spencer et al., 2019). For example, literal questions require the understanding of information that is directly presented in the text while necessary inference questions require “reading between the lines” to understand. Most studies do not distinguish between question type to analyze how individuals respond to specific questions. Friesen and Frid (2021) looked at reading strategies that predicted comprehension success based on question type. They found that focusing on the text itself supported the reader’s recall of specific content to answer literal questions. Inferencing and visualizing behaviours were found to support the readers’ ability to answer inferencing questions.

The knowledge gained from the literature demonstrates (a) the importance of recruiting certain reading strategies for comprehension, (b) varied strategy recruitment predicts successful comprehension, and (c) combined strategy recruitment is important for deep understanding rather than shallow understanding. With this information in mind, and knowing these readers were recruiting strategies in a self-directed manner, it raises the question: does directed strategy recruitment improve readers’ text comprehension?

3.3 The Impact of a Reading Strategy Intervention on Reading Comprehension

Reading strategy instruction typically involves five phases: (1) explicit description of strategies and how strategies should be used, (2) modeling of the strategy, (3) collaborative use of the strategy, (4) guided practice using the strategy, and (5) independent use of the strategy (Duke & Pearson, 2002). This approach teaches readers

when it is appropriate to recruit certain strategies and how to do so. Reading strategy interventions have been shown to improve reading comprehension within L2 adult readers (Karimi, 2015; Salataci & Akyel, 2002). Zhang (2008) conducted a study that examined reading strategy instruction and reading comprehension success amongst EFL college students from China. Participants who were assigned to the intervention group (i.e., two-month strategy training) showed progress in their perceived reading strategy use as well as their actual reading comprehension.

Salataci and Akyel (2002) investigated reading strategies of eight Turkish English as Foreign Language (EFL) college students using a four-week course on reading strategies. Students were required to make predictions about a text by looking at the title, observe the teacher model three strategies (i.e., summarizing, predicting, clarification), rehearse the strategies and track their predictions, questions, summaries and comprehension concerns on a worksheet. The data came from think-aloud responses, observations, a background questionnaire and a preliminary English test. Strategy instruction had a positive effect on both Turkish and English reading strategies and reading comprehension in English. Interestingly, this study is one of the few to incorporate the use of a visual organizer to track their progress and organize their thoughts, but a control group was not included.

The incorporation of a visual organizer to teach reading strategies has been examined in reading intervention literature (Gallagher & Pearson, 1989; Geva, 1983; Jiang & Grabe, 2007; Wanzek, Vaughn, Roberts & Fletcher, 2011). Jiang and Grabe (2007) investigated the importance of adopting graphic organizers in comprehension instruction since graphic organizers represent the discourse structures of a text. The

authors pointed out the limited graphic organizer research to assist reading instruction in L2 students. According to Jiang and Grabe (2007), graphic organizers typically include gaps for the student to complete, but include key words that prompt comprehension (i.e., _____ is a _____ that _____). Though graphic organizers are typically presented in this manner, a pre-constructed graphic organizer that presents the student with actions and prompts certain behaviours (i.e., reading strategies) has yet to be explored.

Aside from the novel use of a pre-constructed graphic organizer, to our knowledge, a single-session intervention has also not been investigated. Based on previous work (Fitrisia, Tan & Yusuf, 2015; Mokhtari & Reichard, 2002), we assume that adults have some awareness of the strategies they are recruiting, but they may require support in how to combine strategies effectively. The current study uses this knowledge to create a single-session flowchart strategy intervention including particular strategies known to predict reading comprehension success. Participants were required to follow the flowchart during each of their think-alouds by selecting particular strategies based on their thought processes and follow the pathway. They were taught how to use the flowchart through explanation, modelling, collaborative use and independent practice. This teaching method is based on the reciprocal teaching model (Palincsar, 1982). Bilingual adult readers may have the necessary foundational skills such that a short intervention would be appropriate to create a more comprehensive text representation and increase reading comprehension performance.

3.4 The Current Study

The goal of the current study was to determine whether a reading strategy intervention will improve readers' reading comprehension performance. We hypothesized that (a) readers in the intervention group will be able to adopt the strategy

recruitment framework presented after a single instructional session and (b) readers exposed to the single-session intervention will exhibit significantly greater gains reading comprehension performance than readers in a control group. In addition, an exploratory question was posed about the type of question would be more impacted by the intervention (e.g., literal vs. inferencing). To test these hypotheses, English-French bilingual adults were randomly assigned to the intervention group (i.e., strategy intervention) or the control group (i.e., no intervention). The intervention included an explanation of the strategy flowchart, modeling of the flowchart, collaborative use of the flowchart and individual practice with the flowchart. All participants completed the same pre-intervention reading comprehension task (the pre-test) and the post-test reading comprehension task. However, the intervention group was asked to use their newly acquired flowchart to complete the second reading comprehension task. The implications of this current research are to provide knowledge about a single-session flowchart intervention and its association with reading comprehension performance.

3.5 Method

3.5.1 Participants

Sixty-one English-French bilingual adults participated in this study. Twelve participants were removed because of missing data (technical issues due to Wi-Fi connection, such as freezing and stalling). Of the 49 remaining participants ($M_{\text{age}} = 25.8$ years, $SD_{\text{age}} = 4.9$, 43 females), 33 of the adults spoke English as a first language (L1). The other L1s were Dutch ($n = 1$), French ($n = 9$), Polish ($n = 1$), Arabic ($n = 1$), Cantonese ($n = 1$) and Spanish ($n = 3$). Participants spent an average of 26.8 h ($SD = 36.5$) reading in English and 4.2 h ($SD = 9.9$) reading in French each week. The 16 individuals who did not have an L1 of English were exposed to reading material in their mother tongue at an

average of 5.4% of the time ($SD = 13.1$), compared to reading material in English ($M = 84.7\%$, $SD = 13.7$) and French ($M = 9.9\%$, $SD = 9.3$). Additionally, participants rated themselves on a scale of 1-5 (1 being *strongly disagree* and 5 being *strongly agree*) when asked if they considered themselves to be a good English reader ($M = 4.9$, $SD = 0.5$) and a good French reader ($M = 3.9$, $SD = 0.8$). All participants had normal or corrected-to-normal vision.

3.5.2 Measures

3.5.2.1 Language experience questionnaire

Language experience was assessed using a questionnaire that was modelled after the Language and Social Background Questionnaire (LSBQ) reported in Anderson, Mak, Chahi and Bialystok (2018). Participants were asked about the percent of time they spent speaking, listening, reading and writing in English, French and any other languages. They were asked about their parents' language experience and where they learned English and French (i.e., home or school). The questionnaire included items that asked participants to rate their understanding and reading ability in English and French and their reading preferences (Appendix A).

3.5.2.2 Reading comprehension task & Intervention

Twelve passages (i.e., six in the pre-test, six in the post-test) were taken from the Gray Oral Reading Test (GORT, Wiederholt & Bryant, 2001). Six of the passages were from Form B and six from Form A. Form B texts were forward and backward translated to French by Jared et al. (2011). Three passages in each language were presented at both pre-test and post-test. Two versions of the task were created to counterbalance the order of texts with half of the participants receiving Version A at pre-test and Version B at post-test; the other half received the Version B a pre-test and Version A at post-test.

Participants alternated between English and French passages, starting with an English one. The passages increased in difficulty, which means participants started with an easy English and French story and ended with a more difficult English and French text within both sessions. Texts were counterbalanced in this manner to ensure that all participants were exposed to the texts similarly (i.e., English, French, English, French,...) regardless of group. In addition, participants were taught how to follow the flowchart using the same example story. Had we separated the texts into two separate sessions by language, there may have been a carryover effect for those in the intervention group learning to use the flowchart a second time. Comprehension may have improved for readers learning the flowchart a second time as a result of practicing using the flowchart. As a result, all texts were read in a counter-balanced fashion within a single session.

Participants were randomly assigned to the strategy intervention group or the control group. For pre-test, both groups read six stories (i.e., three English stories, three French stories). Each story was presented two sentences at a time. After participants read each section, they were prompted by the researcher to complete a think-aloud response. Participants expressed their thoughts in the language of their choice (i.e., English or French). The earlier parts of the text remained on the screen during each think-aloud opportunity. This occurred four times per story until the entire text was presented on the screen. Following the last think-aloud, the story disappeared, and three open-ended reading comprehension questions were presented consecutively. Participants did not have access to the text to answer the comprehension questions. Participants were presented with an example English story before beginning the task. The researcher pre-recorded think-aloud responses and played them for the participant at the designated time points.

When it was time for the participant to complete the task, they were provided with a strategy prompt sheet that include sentence starters (i.e., I wonder if..., I predict that..., This makes me think of...) to facilitate their think-aloud responses (Appendix B).

For the post-test, individuals in the control group completed the same reading comprehension task with a new exemplar story and a second block of texts. They also had access to the strategy prompt sheet. For the strategy intervention, assigned participants were provided with the strategy flowchart (Appendix C). The flowchart required participants to choose one of five strategies (i.e., summary, visualization, prediction, question or text structure) and prompted them to continue their thought with a “because statement” during their think-alouds (i.e., “*I wonder if Harriet saves all of the slaves because she is working hard to free her people*”). The purpose of including a flowchart was to easily guide participants through varying texts to recruit particular strategy patterns known to result in successful comprehension (Frid & Friesen, 2021). Participants were able to choose more than one strategy per think-aloud, depending on whether they had more to say about the excerpt they read. The chart also prompted participants to comment on previous thoughts mentioned in earlier think-aloud responses (i.e., “*I still wonder if Harriet saves all of the slaves because it sounds like the journey was treacherous*”).

The researcher reviewed the flowchart with the participant and explained how and when to use it. Then, an exemplar story was presented. The researcher completed sample think-alouds in real time with the participant and also provided the participant an opportunity to practice using the flowchart. The researcher guided the participant by reminding them about “because statements” and prompting them to pick more than one

strategy. Next, the participant was presented with an additional example story where they practiced using the flowchart on their own with minimal assistance from the researcher. However, the researcher corrected and scaffolded when needed. Following the second exemplar, participants were presented with the second block of six texts (i.e., three in English, three in French) and the task was identical to that of the control group. That is, they were required to complete the reading comprehension task (i.e., reading the story two sentences at a time, four think-aloud responses per story, three reading comprehension questions), but instead of using the strategy prompt sheet, they were required to use the strategy flowchart.

The examiner transcribed the verbalizations of each participant's think-aloud responses and responses to the reading comprehension questions. The reading comprehension questions were scored between 0 to 2 (i.e., 0 being incorrect, 1 being partially correct, and 2 being completely correct). Interrater reliability (IRR) was assessed using a two-way mixed, consistency, single-measures inter-class correlation (ICC; McGraw & Wong, 1996) to assess the degree to which coders provided consistency in their ratings of reading comprehension across 40% of randomly selected participants (Hallgren, 2012). An inter-class correlation (ICC) score was calculated to determine inter-rater reliability between two coders' reading comprehension scoring. IRR being poor is an ICC value less than .40, fair for values between .40 to .59, good values between .6 to .74, and excellent for values between .75 to 1.0 (Cicchetti, 1994). The resulting ICC was in the excellent range, $ICC = 0.78$. This indicates that the raters had a high degree of agreement between their scores.

3.5.2.3 Expressive vocabulary knowledge

Vocabulary knowledge was assessed using a verbal fluency task in both English and French (Delis, Kaplan & Kramer, 2001). The verbal fluency task requires participants to name as many items as they can in a category while timed for 1-minute. Participants completed two category trials in each language (i.e., clothing articles and occupations in English; fruits/vegetables and animals in French). Participants' responses were audio-recorded and transcribed. Each response that fit the category was assigned a point. However, participants were not given credit for a superordinate category (e.g., shirt) if specific exemplars were expressed (e.g., tank top). Similarly, if participants expressed different members of the same species (i.e., red pepper, green pepper, yellow pepper... or black bear, polar bear, grizzly bear...) they were only given one point. The total expressive vocabulary knowledge score was averaged across both categories in each language. Interrater reliability (IRR) was assessed using a two-way mixed, consistency, single-measures inter-class correlation (ICC; McGraw & Wong, 1996) to assess the degree to which coders provided consistency in their ratings of verbal fluency across 25% of randomly selected participants (Hallgren, 2012). The resulting ICC for English verbal fluency was in the excellent range, $ICC = 0.91$ (Cicchetti, 1994), indicating that coders had a high degree of agreement. The resulting ICC for French verbal fluency was in the excellent range, $ICC = 0.99$.

3.5.2.4 Word reading efficiency

English word reading fluency was assessed using the Test of Word Reading Efficiency (TOWRE; Torgesen, Wagner, & Rashotte, 1999). A French version created by Jared et al. (2011) was also used. The TOWRE includes two lists; one with 104 real words and one with 63 non-words. Non-words followed legal orthographic patterns and

are read using the target language's spelling-sound correspondences. Lists were read aloud as quickly and accurately as possible in 45 seconds. Scores were the total number of correctly pronounced items. In English, the alternative forms have a reliability of .93 for the word subtest and .94 for the non-word subtest. The French version had a single form so no alternative reliability is available. IRR was assessed using a two-way mixed, consistency, single-measures ICC on 25% of randomly selected participants (Hallgren, 2012). The resulting ICC for word reading and nonword reading were all within the excellent range (Cicchetti, 1994), indicating that coders had a high degree of agreement. The $ICC = 0.97$ for English word reading, $ICC = 0.93$ for English non-word reading, $ICC = 0.97$ for French word reading, and $ICC = 0.98$ for French non-word reading.

3.5.3 Procedure

Ethics approval was obtained from the university's non-medical research ethics board. Participants were recruited through a social media platform (i.e., Facebook) and consenting participants completed the Language Experience Questionnaire online via Qualtrics. A single two-hour testing session was arranged between the researcher and participant to complete the study online via Zoom (version 5.5.2). Participants were randomly assigned to the control group or the intervention group using a number randomizer. Participants entered the Zoom meeting using a unique password and the researcher shared their screen for participants to see. The testing stimuli were presented on a Microsoft PowerPoint (version 16.46) presentation controlled by the researcher (i.e., switching between tasks). For all participants, tasks were completed in the same order: reading comprehension task (block 1), English verbal fluency, English TOWRE, French verbal fluency, French TOWRE, and reading comprehension task (block 2). Individuals in the control group completed the second block of the reading comprehension task and

the individuals in the intervention group were trained to use the flowchart before completing the second block. Participant responses were audio-recorded throughout the session.

3.6 Results

3.6.1 Descriptive statistics

The descriptive statistics for language proficiency measures and RC scores are reported in Table 6. A 2 x 2 analysis of variance (ANOVA) was completed to determine whether significant differences in language proficiency exist between participants in the experimental groups. Language and group were the two variables included in this analysis. With respect to word reading, participants performed better in English than in French, $F(47) = 33.41, p < .001, \eta_p^2 = .42$. There was no effect of group, $F(47) = 0.20, p > .65, \eta_p^2 = .00$. No interaction existed between language and group, $F(47) = 1.14, p > .29, \eta_p^2 = .02$. For nonword reading, there was no effect of language, $F(47) = .01, p > .94, \eta_p^2 = .00$, or group, $F(47) = .09, p > .75, \eta_p^2 = .00$. No interaction existed between language and group, $F(47) = 1.0, p > .75, \eta_p^2 = .00$. On the verbal fluency task, participants produced more items on the English version than on the French version of the task, $F(47) = 77.53, p < .001, \eta_p^2 = .62$. In addition, the control group had higher scores than the intervention group on the verbal fluency measures, $F(47) = 9.50, p < .01, \eta_p^2 = .17$. No interaction existed between language and group, $F(47) = 1.26, p > .26, \eta_p^2 = .03$.

Table 6
Means and standard deviations for language measures in both languages within bilingual adults

Language measures	English		French	
	Control	Intervention	Control	Intervention
Word fluency (maximum = 104)	93.6 (9.4)	94.0 (8.5)	86.9 (10.8)	84.3 (10.6)
Non-word fluency (maximum = 63)	55.1 (5.0)	55.8 (4.4)	55.3 (6.8)	55.5 (5.0)
Verbal fluency	48.0 (10.3)	43.4 (8.2)	34.8 (11.8)	26.3 (8.0)

Bolded values denote significant differences between groups

3.6.2 Use of the “because statement”

Table 7 reports the frequency of “because statements” made by participants in each group as a function of time. The word “because” was central to the intervention since it served as a marker to determine whether participants were following the flowchart. To investigate whether participants were using more “because statements” during the post-test in comparison to the pre-test as a focus of intervention group, a repeated measures analysis of variance (ANOVA) was completed with language and time as within-subjects variables, and group as a between-subjects variable. There was a main effect of group, $F(47) = 42.41, p < .001, \eta_p^2 = .47$, and a main effect of time, $F(47) = 89.82, p < .001, \eta_p^2 = .66$. Moreover, there was an interaction between time and group, $F(47) = 65.13, p < .001, \eta_p^2 = .58$. A pairwise comparison was completed and individuals in the intervention group recruited more “because statements” at time 2 than time 1, $F(47) = 164.00, p < .001, \eta_p^2 = .78$. There was no significant difference between participants use of “because statements” in the control group, $F(47) = 0.93, p > 0.34$. No other effects were significant, all $F_s < 1.62, n.s.$

Table 7
Means and standard deviations for “because statement” scores between adult groups in both languages

“Because statement” count	English		French	
	Pre-test	Post-test	Pre-test	Post-test
Control Group	6.0 (3.4)	6.6 (4.6)	6.0 (3.5)	5.8 (4.1)
Intervention Group	6.6 (5.0)	18.2 (7.9)	7.0 (3.8)	16.0 (6.0)

Bolded values denote significant differences between pre-test and post-test

3.6.3 Reading comprehension achievement

Table 8 outlines the reading comprehension scores between participants in each group at pre-test and at post-test in English and French. To explore reading comprehension achievement from time 1 to time 2, a repeated ANOVA was completed with language and time as within-subject variables, and group as a between-subjects variable. There was a main effect of language, $F(47) = 4.09$, $p < .05$, $\eta_p^2 = .08$, where participants responded to more questions correctly in English than in French. There were no main effects of group, $F(47) = 1.35$, $n.s.$, $\eta_p^2 = .03$, or time, $F(47) = .25$, $n.s.$, $\eta_p^2 = .01$. Likewise, there were no significant two-way interactions of language and group, $F(47) = .73$, $n.s.$, $\eta_p^2 = .02$, time and group, $F(47) = .63$, $n.s.$, $\eta_p^2 = .01$, or language and time, $F(47) = .001$, $n.s.$, $\eta_p^2 = .001$. There was also no three-way interaction of group, time and language, $F(47) = .34$, $n.s.$, $\eta_p^2 = .01$.

Table 8
Means and standard deviations for reading comprehension scores between adult groups in both languages

Reading comprehension*	English		French	
	Pre-test	Post-test	Pre-test	Post-test
Control Group	12.0 (3.2)	12.1 (2.3)	11.8 (2.9)	11.6 (3.2)
Intervention Group	11.4 (3.3)	11.7 (3.2)	10.3 (3.4)	10.9 (3.2)

*Maximum reading comprehension score is 18 for pre-test and post-test in English and French

3.6.4 Reading comprehension question type

Since the strategy intervention did not produce overall gains in reading comprehension performance, an exploratory analysis of whether differences were observed in the type of reading comprehension questions was conducted. The descriptive statistics for reading comprehension performance as a function of question type, language, time, and group are displayed in Table 9. A repeated measures ANOVA was performed with language, time and question type being within-subjects factors, and group being a between-subjects factor. Firstly, there was a main effect of language, $F(47) = 4.78, p < .05, \eta_p^2 = .09$, and question type, $F(47) = 6.63, p < .01, \eta_p^2 = .22$. Post-hoc tests revealed that participants performed significantly better on necessary inference questions than on literal questions, $F(47) = 6.63, p < .01, \eta_p^2 = .22$. There were no significant main effects of group, $F(47) = 1.26, n.s., \eta_p^2 = .03$, or time, $F(47) = .34, n.s., \eta_p^2 = .01$.

Table 9
Means and standard deviations for reading comprehension question type for bilingual adults in each group and in both languages

Reading Comprehension Question Type	English				French			
	Control		Intervention		Control		Intervention	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Literal	4.0 (1.3)	4.1 (1.3)	3.9 (1.4)	4.0 (1.5)	3.5 (1.2)	3.2 (1.4)	3.1 (1.2)	3.4 (1.4)
Nec. Infer.	4.2 (1.4)	4.4 (1.0)	3.8 (1.2)	4.1 (1.5)	3.9 (1.3)	4.2 (1.2)	3.5 (1.4)	3.9 (1.2)
Elab. Infer.	3.9 (1.3)	3.6 (1.3)	3.7 (1.5)	3.5 (1.6)	4.3 (1.3)	4.2 (1.4)	3.7 (1.6)	3.5 (1.7)

Additionally, there was a significant 2-way interaction between language and question type, $F(47) = 8.02$, $p < .001$, $\eta_p^2 = .26$. A significant simple main effect was observed where participants had higher scores on English literal questions relative to French literal questions, $F(47) = 18.09$, $p < .001$, $\eta_p^2 = .28$ (Table 10). No significant simple main effects across languages were observed for necessary inference questions, $F(47) = 2.31$, *n.s.*, $\eta_p^2 = .05$, or elaborative inference questions, $F(47) = 2.46$, *n.s.*, $\eta_p^2 = .05$. No additional significant 2-way, 3-way or 4-way interactions were found, $F_s < 1.73$, $p_s > .05$.

Table 10
Means and standard deviations for adult reading comprehension question type between languages

Reading Comprehension Question Type	English	French
Literal	4.0 (0.2)	3.3 (0.1)
Necessary Inference	4.1 (0.1)	3.8 (0.2)
Elaborative Inference	3.7 (0.2)	3.9 (0.2)

Bolded values denote significant differences between English and French

3.7 Discussion

The current study investigated whether a reading strategy intervention improves reading comprehension performance in bilingual adult readers. Participants were able to

follow the intervention flowchart by recruiting “because statements”. These statements are used to explain why a claim is being made (Dincel, 2019). Furthermore, the “because statement” may be an inference or paraphrasing, which has been shown to be a successful strategy to support comprehension. Specifically, bilingual adult readers in the intervention group used more “because statements” in their think-aloud responses at time 2 than time 1; the control group did not. Furthermore, language did not impact this behaviour, so individuals in the intervention group were making these statements while reading English texts as well as French texts. This finding indicates that a single-session intervention influenced readers’ strategic behaviours. However, no differences were observed in reading comprehension performance for those in the intervention group at time 1 and time 2. Furthermore, there were no gains in English reading comprehension versus French reading comprehension when exposed to the strategy flowchart. This means that a single-session intervention may influence reading behaviour but does not necessarily influence reading comprehension success.

To better understand if there might be nuanced differences at the question type level, we further broke down the analysis by question type. Generally, participants performed better on English reading comprehension questions than French questions, which was expected based on their English language proficiency. Participants also performed better on necessary inference questions than on literal questions. A significant difference occurred on the literal question with participants responding better in English than French. Furthermore, French appeared to be participants’ less-dominant language, which means they may have misunderstood basic information in the texts needed to respond to the literal questions. In addition, they may not have found or retained the

details needed to answer the literal questions, but they were able to retain the general gist of the passage.

This present study included a single-session intervention to determine whether one session is adequate to detect reading comprehension differences between those exposed to the intervention and a control group. The flowchart influenced participants to make more connections between their ideas through “because statements”, which ties with the coherence principle of Graesser et al. (1994) constructionist model. Relatedly, the participants’ behaviour while using the flowchart meets the criteria of the explanation principle since the reader thinks more critically about the text by selecting particular strategies, which then allows the reader to generate explanations of why events and actions are happening. Nash-Ditzel (2010) completed a case study with five college students to observe whether reading behaviour is impacted by reading strategies. The findings demonstrated that increased awareness and practice of reading strategies changes the reader’s strategic behaviour. Furthermore, this study is consistent with the current study’s finding that guided strategy use alters one’s strategy selection. Yet, the purpose of the reading strategy intervention was to improve reading comprehension success in the readers in the intervention groups.

Previous studies have shown the positive impact of guided strategy selection on reading comprehension gains (Karimi, 2015; Salataci & Akyel, 2002). The Salataci and Akyel (2002) study took place over a four-week program, but the study did not include a control group. Furthermore, without a control group, it is unclear whether the program did influence readers’ strategic behaviour or result in reading comprehension gains. In addition, Zhang’s (2008) intervention study with EFL college students from China

demonstrated progress in readers' perceived reading strategy use as well as their reading comprehension. Even though reading comprehension gains were not achieved in this current study, progress in reading strategy recruitment was also reflected in this current study by the reading behaviours readers engaged in (i.e., "because statements").

Specifically, the use of a visual organizer/flowchart has been shown to be a successful teaching tool (Geva, 1983; Jiang & Grabe, 2007; Wanzek et al., 2011). The features of a flowchart allow the reader to guide their thinking in a systematic manner, which is why a flowchart was adopted for this current study. Providing a visual component to accompany the task (i.e., reading comprehension) allows the reader to internalize the task expectations. Jiang and Grabe (2007) acknowledged in their paper the need for more L2 graphic organizer research. Despite the novelty of including a strategy intervention in the form of a flowchart and observing reading behaviour changes in adult bilingual readers, limitations must be considered.

3.7.1 Limitations

The contributions of this study should be considered in light of its limitations. Firstly, the use of a single-session intervention may not have been sufficient time for participants to fully understand how to use the tool effectively. Even though they were provided with two example stories, they may have needed more time to practice using the flowchart to see transfer effects to reading comprehension performance. Elbaum, Vaughn, Hughes and Moody (2000) completed a meta-analysis on one-on-one instruction and found that higher effects were yielded in interventions of 20 weeks or more, suggesting that students may make the greatest gains early in the intervention, but continue to require monitoring.

Secondly, it is important to note that when participants were asked to respond to the reading comprehension questions, they did not have access to the text. Participants were required to retain the content of each passage and read with the goal of comprehending. Along with remembering the text, there was also mental demand on the individuals in the intervention group to properly follow the reading strategy flowchart. This may have put a strain on their working memory, which resulted in them forgetting details from the text when it came time to answering the reading comprehension questions. However, participants continued to have access to the flowchart to support their strategy use, which may have taken some of the load off trying to think about how best to engage with the text.

Thirdly, the participants in this study were recruited over social media and connected with the researcher if they were interested in participating. Based on this recruitment model, participants were likely interested in reading in their L1 and L2, and they likely engaged in successful reading strategies in their day-to-day reading. If a different recruitment model was employed, we may have seen more diversity between our participants' reading behaviour and ability. Frandsen, Thow and Ferguson (2016) looked at the popularity of recruiting participants through social media platforms. They found that this method of recruitment has become more favourable to researchers. Yet, no studies have examined how participants recruited over social media compare to participants recruited used more traditional recruitment methods. This provides opportunities for researchers to further investigate whether recruitment methods impact participant performance.

3.7.2 Next steps

The bilingual adults in this study did not demonstrate significant gains in their reading comprehension when exposed to an intervention. However, bilingual children have less-developed reading abilities and may demonstrate more individual differences, which may provide interesting results when exposed to a single-session intervention. Our next step is to complete the same methodology with a younger population to note whether a single-session intervention improves reading comprehension between time 1 and time 2 for individuals in the intervention group. The information collected from this upcoming research will provide more information about the effectiveness of a single-session intervention as well as the fidelity of a younger population following the flowchart model. Incorporating the same methodology will allow us to directly understand the benefits and consequences of guiding participant reading behaviour in this manner as well as provide more information needed to adapt this existing framework.

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4 Chapter Four: Reading Strategy Intervention with Bilingual Children

Approximately 2.4 million young Canadians study French or English as a second language in Canada (Statistics Canada, 2003-2017). With the rise in French immersion enrolment, there are more students learning and reading in a bilingual additive environment. French immersion programs follow different models, but many programs teach students solely in French up until fourth grade when English instruction is introduced (Genesee, 2004). Despite the amount of French instruction in French immersion settings, French reading performance often lags in comparison to English reading amongst young French immersion students (Cashion & Eagan, 1990; Frid & Friesen, 2020; Geva & Clifton, 1994). Therefore, a renewed emphasis on effective reading instruction is necessary to teach students how to effectively extract meaning from print. The goal of the present study was to employ a reading strategy intervention with young bilingual readers with the hopes of influencing their reading behaviours and reading comprehension success.

Given concerns about academic outcomes, parents often struggle with the decision to send their young children to French immersion programs. Although parents see the benefits of immersion such as learning a second language and picking up new languages more easily after learning two simultaneously (Roy & Galiev, 2011), they worry about their ability to support their child's success if they are struggling (Werker & Byers-Heinlein, 2008). Not being bilingual themselves, many parents may have difficulty supporting reading comprehension development in French. Thus, it is particularly important that children are taught effective reading comprehension strategies at school.

Previous research has investigated the reading skills that bilingual children require to be successful comprehenders in their two languages (Frid & Friesen, 2020; Muijselaar et al., 2017; Uhl-Chamot, 2004). In general, reading comprehension requires skilled word decoding and language knowledge (Gough & Tunmer, 1986; Scarborough, 2001), as well as appropriate use of metacognitive strategies (Frid & Friesen, 2020; Muijselaar et al., 2017; Uhl-Chamot, 2004). These components have been shown to be unique predictors of reading comprehension success (Frid & Friesen, 2020). A distinction can be made between language-based skills like decoding and higher-order processes like using metacognitive strategies. For example, the Simple View of Reading Model (Gough & Tunmer, 1986) focuses primarily on two factors that contribute to reading comprehension. It asserts that reading comprehension success depends on word decoding and language comprehension. Linguistic comprehension is the process in which words, sentences and discourses are understood. Word decoding is the ability to apply knowledge of letter-sound relationships and is taught to young readers during the “learning to read” phase. Although these components are important, they do not emphasize the role of reading strategies.

4.1 Reading Strategy Recruitment

Reading strategies involve intentional control and deliberate behaviours, such as adapting and monitoring one’s performance (Afflerbach, Pearson & Paris, 2008). According to Rumelhart’s (1980) schema theory, the reader uses their prior knowledge to comprehend and learn from texts. In other words, a text does not carry meaning by itself; the reader must retrieve and construct meaning from previously acquired knowledge (An, 2013). This meaning construction may be completed through strategic reading behaviour. Reading strategies are taught to young children in the education system, as they do not

develop well naturally without support. The utilization of reading strategies enables greater reading comprehension success. Reading strategies are a primary focus during the “reading to learn” phase and require the reader to understand what they are reading before creating a mental representation of the text.

Commonly studied reading strategies include (i) summarizing – paraphrasing the text, (ii) inferencing – reading “between the lines”, (iii) predicting – guessing what is to come, (iv) using background knowledge– accessing previous information from the story or personal knowledge to understand the context of the text, or (v) questioning – asking questions about the text (Blachowicz & Ogle, 2017; Coiro & Dobler, 2007). Previous research has demonstrated that recruitment of particular reading strategies predicts more successful comprehension in bilingual children (Frid & Friesen, 2020; Jimenez et al, 1996; Muijselaar et al., 2017). For instance, Frid and Friesen (2020) investigated reading strategy recruitment and reading comprehension in fourth- and fifth-grade French immersion students by having the students read passages, complete think-aloud protocols and answer reading comprehension questions. After coding the participants’ think-aloud responses as strategies, they found that using text-based strategies and background-related strategies in both languages accounted for variance in reading comprehension performance. Furthermore, specific strategies led to more successful reading comprehension in young bilingual readers.

To better understand the distinction between successful readers and less-successful readers, Frid and Friesen (2021; chapter 2) conducted a follow-up study where they examined the strategy recruitment patterns of low and high performing children from their 2020 study. The low achieving students perseverated on specific strategies

(i.e., summarizing, predicting), they made incorrect statements in their think-aloud responses, and they recruited fewer strategies than the high achieving students. The bilingual children who were high performers recruited various strategies, made connections between their thoughts and elaborated on their ideas through “because statements”. The participants in this study self-selected strategies while they read and, the low performing students did not effectively recruit strategies.

Similar to self-selected strategy use, self-guided learning has been known to be an appropriate learning approach (Benson & Chik, 2010). Self-guided learning is a learning strategy which allows the learner to take charge of their own learning process by drawing on previous knowledge taught to further gain new knowledge independently (Chuang & Crowder, 2019). Despite the goal of independent learning, King (2011) asserts that teacher support for learners is critical for the success of self-guided learning. Therefore, implementing a teaching model or intervention with teacher support that leads to independent strategy recruitment is a critical step in understanding how strategic behaviour influences reading comprehension.

4.2 Reading Strategy Intervention

Reading strategy instruction can improve reading comprehension achievement in monolingual children (e.g., Crowe, 2005; Noell et al., 2000; Spörer, Brunstein & Kieschke, 2009) and bilingual children (e.g., Aghaie & Zhang, 2012; Graham & Macaro, 2008; Spörer et al., 2009). A widely-used process in interventions incorporates five phases of strategy instruction, (1) explicit description of strategies and how strategies should be used, (2) modeling of the strategy, (3) collaborative use of the strategy, (4) guided practice using the strategy, and (5) independent use of the strategy (Duke &

Pearson, 2002). Typically, these phases are completed over multiple sessions to acclimate the reader to the intervention.

Aghaie and Zhang (2012) explored the impact of explicit teaching of reading strategies to intermediate-level English as a foreign language (EFL) students' reading performance in Iran. The study employed a cognitive and metacognitive strategy questionnaire and involved an intervention program for the treatment group. The control group did not undergo treatment. The intervention program included preparation, presentation, practice, self-evaluation, expansion, and assessment. The program took 4 months to complete. Think-aloud protocols of students' use of cognitive and metacognitive reading strategies was completed in the post-test with all participants. Participants comprehension was assessed using a multiple-choice test. Results showed that strategy instruction contributed to autonomous reading behaviours and reading comprehension; reading strategy use improved with strategy instruction. Thus, a multiple-session intervention impacted both students' reading behaviour and comprehension.

Previous research has demonstrated the feasibility of using strategy interventions to influence reading comprehension (Katz & Carlisle, 2009; Petersen et al., 2020). Katz and Carlisle (2009) introduced their readers to the Close Reading program, which combined instruction in morphological (i.e., reading unfamiliar words) and context strategies (i.e., deriving meaning from unfamiliar words). Instruction in these strategies improved word reading and comprehension. Petersen et al. (2020) explored the effects of an oral narrative language intervention (i.e., spoken story) on reading comprehension. Narrative instruction improved oral narrative language and reading comprehension for

the intervention group but not the control group. In addition to reading comprehension gains, it is unclear whether a reading strategy intervention can alter reading behaviours as well.

4.3 The Current Study

The goal of the present study was to determine whether a reading strategy intervention encourages young bilingual readers to follow the flowchart effectively, and improve reading comprehension. Fourth- to sixth-grade French immersion students were recruited and randomly assigned to the reading strategy intervention group or the control group. The same reading comprehension task was completed with all participants, but students in the intervention group were required to follow a flowchart as a guide through their think-aloud responses during the reading comprehension task. The flowchart included different pathways to follow. For instance, participants could make predictions, ask a question, paraphrase what was presented or comment on the text features. Participants were required to make “because statements” following each strategy to generate an explanation of their thought-process and elaborate beyond the text. Lastly, the flowchart prompted them to make connections between their think-aloud responses. The specific features of the flowchart (i.e., “because statements” and connections) are based on the work conducted by Frid and Friesen (2021). Skilled readers in the Frid and Friesen (2021) study recruited various strategies, made connections between their think-alouds and used “because statements”, while poor readers perseverated on strategies, made incorrect statements and recruited fewer strategies. Therefore, the flowchart promoted skilled strategy use amongst the readers in this study.

An iteration of this study was completed with an adult bilingual population (i.e., Chapter 3). The findings of the adult study demonstrated that a single-session

intervention did not result in gains in reading comprehension performance, but it did influence readers' strategic behaviour. Since bilingual adults are thought to be more proficient readers due to age and experience, their recruitment of additional strategies may have not aided in their text understanding. In contrast, guiding child participants to recruit successful strategies may improve their reading comprehension and reading behaviour since they still in the process acquiring reading strategies and their reading proficiency may not be as well-developed as the adult readers.

In addition to the importance of focusing on guided reading strategy selection, participants responded to different types of comprehension questions (i.e., literal questions, necessary inference questions, elaborative inference questions). The purpose of including different question types was to determine whether participants exposed to the intervention achieved different gains depending on which information was necessary to respond. Friesen and Frid (2021) found that bilingual adult readers who relied on text analysis strategies (i.e., vocabulary, text structure, predicting, connecting) and meaning extraction strategies (i.e., inferencing and visualizing) answered literal questions and inferential questions better than those who did not rely on these strategies. Similarly, this current research analyzed how participants responded to literal, necessary inference, and elaborative inference questions in English and French.

Our two research questions included (a) will a single-session intervention result in comprehension gains? (b) Will readers in the intervention group adopt the strategy recruitment framework in their think-aloud responses? We hypothesized that (a) readers exposed to the single-session intervention would achieve reading comprehension gains, and (b) readers in the intervention group will adopt the strategy recruitment framework

presented. An exploratory analysis was completed to understand which reading comprehension question type was responded to most successfully in comparison to others. This research is intended to inform immersion educators with knowledge regarding teaching reading strategies and whether a single-session intervention is sufficient to observe any gains in child learners.

4.4 Method

4.4.1 Participants

Forty-five French immersion students in grades 4 to 6 participated in this study. One participant was removed because they did not complete all tasks. Of the 44 remaining participants ($M_{age} = 10.2$ years, $SD_{age} = 0.9$, 29 females), 30 of the children spoke English as a first language (L1). The other L1s were Russian ($n = 7$), Mandarin ($n = 2$), Hebrew ($n = 1$), Tamil ($n = 2$), and Greek ($n = 2$). Participants spent an average of 4.7 h ($SD = 3.8$) reading in English and 1.5 h ($SD = 2.4$) reading in French per week. Participants were enrolled in a French immersion program for an average of 4.8 years ($SD = 1.1$). Participants' parents rated their children on a scale of 1-5 (1 being *strongly disagree* and 5 being *strongly agree*) when asked if they considered their child to be a good English reader ($M = 4.5$, $SD = 0.8$) and a good French reader ($M = 3.7$, $SD = 1.0$). All participants had normal or corrected-to-normal vision.

4.4.2 Measures

4.4.2.1 Language experience questionnaire

Language experience was assessed using a questionnaire that was modelled after the Language and Social Background Questionnaire (LSBQ) reported in Anderson, Mak, Chahi and Bialystok (2018). Participants' guardians were asked to complete the questionnaire about their child. They were asked about their child's language experience

and where they learned English and French (i.e., home or school). The questionnaire included items that asked parents to rate their child's understanding and reading ability in English and French and their reading preferences (Appendix D).

4.4.2.2 Reading comprehension task

Participants read eight short texts in this study (i.e., 4 in English and 4 in French). An English example text was presented first, followed by two English texts and two French texts that were counterbalanced, starting with an English story. Subsequent to completing two language proficiency tasks, participants read an additional English example story followed by four more stories (i.e., 2 in English, 2 in French). There were two versions of the task to counterbalance the order of the texts that were read. Seven of the eight stories presented were taken from the Gray Oral Reading Test (GORT, Wiederholt & Bryant, 2001). The story that was not taken from the GORT was created to make the story difficulty comparable across the two versions of the tasks. Four of the stories from form B were forward and backward translated to French by Jared et al. (2011).

During the reading comprehension pre-test, each story was presented two sentences at a time. After participants read each section, they were prompted by the researcher to complete a think-aloud response. Participants expressed their thoughts in the language of their choice (i.e., English or French). The earlier parts of the text remained on the screen during each think-aloud opportunity. This procedure occurred four times per story until the entire text was presented on the screen. Following the last think-aloud, the story disappeared, and three open-ended reading comprehension questions were presented consecutively. Participants did not have access to the text to answer the comprehension questions. Participants were presented with an example story

before beginning the task. The researcher pre-recorded think-aloud responses and played them for the participant at the designated time points. When it was time for the participant to complete the task, they were provided with a strategy prompt sheet that included sentence starters (i.e., I wonder if..., I predict that..., This makes me think of...) to facilitate their think-aloud responses (Appendix B).

For the post-test, participants were randomly assigned to the strategy intervention group or the control group. Individuals in the control group completed the same reading comprehension task with a new exemplar story and a second block of texts. They also had access to the strategy prompt sheet. The strategy intervention was administered to those in the experimental group. These individuals were provided with the strategy flowchart (Appendix C). The researcher reviewed the flowchart with the participant and explained how and when to use it. The flowchart required participants to choose one of five strategies of their choice (i.e., summary, visualization, prediction, question or text structure) and prompted participants to continue their thought with a “because statement” during their think-alouds (i.e., “*I wonder if Harriet saves all of the slaves because she is working hard to free her people*”). Participants were able to choose more than one strategy per think-aloud, depending on whether they had more to say about the excerpt. The chart also prompted participants to comment on previous thoughts mentioned in earlier think-aloud responses (i.e., “*I still wonder if Harriet saves all of the slaves because it sounds like the journey was treacherous*”). The features of the flowchart were created based on the patterns of successful readers found in Frid and Friesen’s (2021) paper.

After the flowchart was explained, an exemplar story was presented. The researcher completed sample think-alouds in real time with the participant and also

provided the participant with an opportunity to practice using the flowchart. The researcher guided the participant by reminding them about “because statements” and prompting them to pick more than one strategy. Next, the participant was presented with an additional example text where they practiced using the flowchart on their own with minimal assistance from the researcher. However, the researcher corrected and scaffolded when needed. Following the second exemplar, participants were presented with the second block of four texts (i.e., two in English, two in French) and the task was identical to that of the control group. That is, they were required to complete the reading comprehension task (i.e., reading the story two sentences at a time, four think-aloud responses per story, three reading comprehension questions), but instead of using the strategy prompt sheet, they were required to use the strategy flowchart. Participants were provided the flowchart throughout the reading comprehension task and they were provided several opportunities to practice using the flowchart before independently working with the tool.

The examiner transcribed each think-aloud response and reading comprehension question response before scoring. The scoring technique involved the examiner assigning a score between 0 to 2 (i.e., 0 being incorrect, 1 being partially correct, 2 being completely correct) to each reading comprehension question response. In addition, the word “because” was tallied across each participant’s think-aloud responses to generate a value for quantity of “because statements”. Inter-rater reliability (IRR) was assessed using a two-way mixed, consistency, single-measures inter-class correlation (ICC; McGraw & Wong, 1996) to assess the degree that coders provided consistency in their ratings of reading comprehension across 35% of randomly selected participants

(Hallgren, 2012). An inter-class correlation (ICC) score was calculated to determine inter-rater reliability between the examiners' reading comprehension scoring. IRR being poor is an ICC value less than .40, fair for values between .40 to .59, good values between .6 to .74, and excellent for values between .75 to 1.0 (Cicchetti, 1994). The resulting ICC was in the excellent range, $ICC = 0.88$. This indicates that the raters had a high degree of agreement between their scores.

4.4.2.3 Expressive vocabulary knowledge

Vocabulary knowledge was assessed using a verbal fluency task in both English and French (Delis, Kaplan & Kramer, 2001). The verbal fluency task requires participants to name as many items as they can in a category while timed for one minute. Participants completed two category trials in each language (i.e., clothing articles and occupations in English; fruits/vegetables and animals in French). Participants' responses were audio-recorded and transcribed. Each response that fit the category was assigned a point. However, participants were not given credit for a superordinate category (e.g., shirt) if specific exemplars were expressed (e.g., tank top). Similarly, if participants expressed different members of the same species (i.e., red pepper, green pepper, yellow pepper...) they were only given one point. The total expressive vocabulary knowledge score was averaged across both categories in each language. Inter-rater reliability (IRR) was assessed using a two-way mixed, consistency, single-measures inter-class correlation (ICC; McGraw & Wong, 1996) to assess the degree that coders provided consistency in their ratings of verbal fluency across 25% of randomly selected participants (Hallgren, 2012). The resulting ICC for English verbal fluency was in the excellent range, $ICC = 0.90$ (Cicchetti, 1994), indicating that coders had a high degree of agreement. The resulting ICC for French verbal fluency was in the excellent range, $ICC = 0.86$.

4.4.2.4 Word reading efficiency

English word reading fluency was assessed using the Test of Word Reading Efficiency (TOWRE; Torgesen, Wagner, & Rashotte, 1999). A French version created by Jared et al. (2011) was also used. The TOWRE includes two lists: one with 104 real words and one with 63 non-words. Non-words followed legal orthographic patterns and are read using the target language's spelling-sound correspondences. Lists were read aloud as quickly and accurately as possible in 45 seconds. Scores were the total number of correctly pronounced items. In English, the alternative forms have a reliability of .93 for the word subtest and .94 for the non-word subtest according to the examiner's manual. The French version had a single form and therefore no alternative form reliability is available. IRR was assessed using a two-way mixed, consistency, single-measures inter-class correlation (ICC; McGraw & Wong, 1996) to assess the degree to which coders exercised consistency in their ratings of word reading and non-word reading across 25% of randomly selected participants (Hallgren, 2012). The resulting ICC for word reading and nonword reading were all within the excellent range (Cicchetti, 1994), indicating that coders had a high degree of agreement. The $ICC = 0.96$ for English word reading, $ICC = 0.98$ for English non-word reading, $ICC = 0.94$ for French word reading, and $ICC = 0.96$ for French non-word reading.

4.4.3 Procedure

Ethics approval was obtained from the university's non-medical research ethics board. Participants were recruited through a social media platform (i.e., Facebook). Guardians of bilingual children consented for their child to participate by signing a letter of information and consent form, as well as completing the Language Experience Questionnaire online via Qualtrics. A single 90-minute testing session was arranged for

the child to complete the study online via Zoom (version 5.5.2). Participants were randomly assigned to the control group or the intervention group using a number randomizer. Participants entered the Zoom meeting using a unique password and the researcher shared their screen for participants to see. The testing stimuli were presented on a Microsoft PowerPoint (version 16.46) presentation controlled by the researcher (i.e., switching between tasks). For all participants, tasks were completed in the same order: reading comprehension task (block 1), English verbal fluency, English TOWRE, French verbal fluency, French TOWRE, and reading comprehension task (block 2). Participants in the control group completed the second block of the reading comprehension task and the participants in the intervention group were trained to use the flowchart before completing the second block. Participant responses were audio-recorded throughout the session.

4.5 Results

4.5.1 Descriptive statistics

The descriptive statistics for language proficiency measures and reading comprehension are reported in Table 11. A 2 x 2 analysis of variance (ANOVA) was completed to determine whether significant differences in language proficiency exist as a function of language or group. For word reading, there was a main effect of language, $F(42) = 45.74, p < .001, \eta_p^2 = .52$, with English word reading scores surpassing French word reading scores. There was no effect of group, $F(42) = .87, p = .35, \eta_p^2 = .02$. Likewise, there was no interaction between language and group for word reading, $F(42) = 1.41, p = .24, \eta_p^2 = .03$. With respect to nonword reading, there was no main effect of language, $F(42) = .40, p = .52, \eta_p^2 = .01$, or group, $F(42) = 1.11, p = .29, \eta_p^2 = .03$. There was no interaction between language and group, $F(42) = .40, p = .52, \eta_p^2 = .01$. In verbal

fluency, participants performed better in English than French, $F(42) = 67.32, p < .001, \eta_p^2 = .62$. There was no main effect of group, $F(42) = .13, p > .72, \eta_p^2 = .00$. However, there was an interaction between language and group, $F(42) = 4.59, p < .05, \eta_p^2 = .10$. The participants in the intervention group performed better on English verbal fluency than French verbal fluency, $F(42) = 56.07, p < .001, \eta_p^2 = .57$. The participants in the control group performed slightly better on the English verbal fluency task than the French verbal fluency task, $F(42) = 17.58, p < .001, \eta_p^2 = .30$, suggesting that it was the magnitude of the difference driving the significant interaction. There were no significant differences between the groups in English, $F(42) = 2.2, p > .14, \eta_p^2 = .05$, or French, $F(42) = .80, p > .37, \eta_p^2 = .02$.

Table 11
Means and standard deviations for language measures within bilingual children in both languages

Language measures	English		French	
	Control	Intervention	Control	Intervention
Word fluency (maximum = 104)	75.5 (7.2)	74.5 (7.5)	68.2 (11.8)	64.1 (12.9)
Non-word fluency (maximum = 63)	40.3 (11.2)	38.0 (8.8)	41.7 (11.6)	38.0 (9.1)
Verbal fluency	27.1 (5.5)	29.6 (5.9)	21.2 (5.2)	19.7 (6.2)

4.5.2 Use of the “because statement”

The number of “because statements” was calculated for each participant during pre-test and post-test in each language. The purpose of completing this analysis was to determine whether participants are following the strategy intervention flowchart. Table

12 reports the frequency of “because statements” made by participants in each group as a function of time and language. To investigate whether participants were using more “because statements” during the post-test in comparison to the pre-test, a repeated measures analysis of variance (ANOVA) was completed with language and time as within-subjects variables, and group as a between-subjects variable. There was a main effect of group, $F(42) = 11.47, p < .01, \eta_p^2 = .21$, a main effect of language, $F(42) = 5.37, p < .05, \eta_p^2 = .11$, and a main effect of time, $F(42) = 39.43, p < .001, \eta_p^2 = .48$.

Participants used more “because statements” while reading the English texts in comparison to reading the French texts. Importantly, there was a significant interaction between time and group, $F(42) = 30.14, p < .001, \eta_p^2 = .42$. Individuals in the intervention group used more “because statements” at time 2 than time 1, $F(42) = 72.55, p < .001, \eta_p^2 = .63$. There was no significant difference between individuals use of “because statements” in the control group, $F(42) = .30, p > .58, \eta_p^2 = .01$. No other effects were significant, all $F_s < 1.0, n.s.$

Table 12
Means and standard deviations for “because statement” scores between child groups in both languages

“Because statement” count	English		French	
	Pre-test	Post-test	Pre-test	Post-test
Control Group	2.3 (2.0)	2.5 (2.3)	1.7 (1.8)	2.1 (2.6)
Intervention Group	1.8 (2.4)	6.5 (2.4)	1.8 (2.1)	5.7 (3.2)

Bolded values denote significant differences between pre-test and post-test

4.5.3 Reading comprehension achievement

Table 13 presents the reading comprehension scores in each group at pre-test and at post-test in English and French. A repeated-measures ANOVA was completed on reading comprehension scores with language and time as within-subject variables, and

group as a between-subjects variable. There was a main effect of language, $F(42) = 5.74$, $p < .05$, $\eta_p^2 = .12$. Participants answered the English reading comprehension questions more successfully than the French reading comprehension questions. There was no main effect of time, $F(42) = 1.34$, $p = .25$, $\eta_p^2 = .03$. There was no significant interaction between time and group, $F(42) = 1.94$, $p > .17$, $\eta_p^2 = .04$. No other effects were significant, all $F_s < 2.0$, *n.s.*

Table 13

Means and standard deviations for reading comprehension scores between child

groups in both languages

Reading comprehension*	English		French	
	Pre-test	Post-test	Pre-test	Post-test
Control Group	7.1 (2.6)	5.5 (2.6)	6.2 (2.4)	5.5 (2.6)
Intervention Group	6.3 (2.7)	6.8 (3.0)	5.9 (2.2)	5.6 (3.0)

*Maximum reading comprehension score is 12 for pre-test and post-test and for English and French

4.5.4 Reading comprehension question type

An exploratory analysis was conducted to determine whether differences existed in responding to different types of questions (i.e., literal, necessary inference and elaborative inference). The descriptive statistics for reading comprehension score as a function of language, time, question type, and group are displayed in Table 14. A repeated-measures ANOVA was performed with language, time and question type being within-subject factors, and group being a between-subjects factor. There was a main effect of language, $F(42) = 5.74$, $p < .05$, $\eta_p^2 = .12$; participants performed better on English reading comprehension questions than French reading comprehension questions. There was also a main effect of question type, $F(42) = 22.45$, $p < .001$, $\eta_p^2 = .52$. Participants responded to literal questions significantly better than elaborative inference

questions, $F(42) = 22.46, p < .001, \eta_p^2 = .52$. Nonetheless, this main effect was qualified by a significant interaction between language and question type, $F(42) = 21.45, p < .001, .51$. Pairwise comparisons revealed that participants responded to literal questions more successfully in French than English, $F(42) = 7.48, p < .01, \eta_p^2 = .15$, and they responded to elaborative inference questions more successfully in English than French, $F(42) = 60.34, p < .001, \eta_p^2 = .59$. No other effects were significant, $F_s < 3.0, n.s.$ The descriptive statistics for this interaction can be found in Table 15. Visual inspection suggested that differences within each language were meaningful. Within English, there was no effect of question type, $F(2) = .55, p > .58, \eta_p^2 = .03$. For French, there was a main effect of question type, $F(2) = 27.94, p < .001, \eta_p^2 = .57$. Participants responded to the literal questions significantly better than the necessary inference questions, $p < .05$, and the elaborative inference questions, $p < .001$. Participants responded to the necessary inference questions significantly better than the elaborative inference questions, $p < .001$.

Table 14
Means and standard deviations for reading comprehension question type for bilingual children in each group and in both languages

Question Type	English				French			
	Control		Intervention		Control		Intervention	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Literal	2.2 (0.9)	1.9 (1.1)	2.3 (0.9)	2.0 (1.0)	2.6 (1.1)	2.5 (1.1)	2.7 (1.3)	2.3 (1.4)
Nec. Inference	2.5 (1.2)	1.8 (1.3)	2.1 (1.3)	2.2 (1.4)	2.2 (1.0)	2.1 (1.1)	2.0 (1.1)	2.2 (1.2)
Elab. Inference	2.4 (1.4)	1.9 (1.4)	1.9 (1.4)	2.6 (1.5)	1.4 (1.2)	1.0 (1.2)	1.2 (1.0)	1.1 (1.3)

Table 15
Means and standard deviations for reading comprehension question type for bilingual children in each language

Question Type	English	French
Literal	4.2 (0.9)	5.0 (2.1)
Necessary Inference	4.3 (2.0)	4.2 (1.8)
Elaborative Inference	4.4 (1.1)	2.3 (1.6)

4.6 Discussion

The current study explored whether a single-session reading strategy intervention improves the reading comprehension scores of French immersion students from fourth- to sixth-grade. The flowchart-style intervention influenced readers' strategic behaviour between pre-test and post-test. Specifically, children could adopt the flowchart within a single session and follow the chart independently after practice and scaffolding. However, the intervention did not result in gains pertaining in reading comprehension success. The findings of this study can inform French immersion educators that multiple-session strategy interventions may be more likely to improve students' reading comprehension, but a single session instructional period is sufficient to alter students' reading behaviours.

Language proficiency was measured and analyzed to ensure that participants in both groups had similar language proficiency skills. No differences existed between the control group and the intervention group, which means their language proficiency skills were alike. Participants performed better on most of the English measures than the French ones and they reported reading and interacting more often in English than French, which may have impacted the discrepancy in language proficiency scores. Furthermore,

this finding suggests that English was the participants' dominant language even though some participants had an L1 other than English or French. Nevertheless, participants completed the non-word reading fluency task comparably between English and French. This finding is supported by Schroter and Schroeder 's (2018) work with bilingual children and their ability to recognize nonwords in each of their languages equivalently. The Frid and Friesen (2020) paper reported similar findings where French Immersion children performed significantly better on all English language measures except for nonword reading.

The "because statement" analysis was completed to determine whether participants in the intervention group followed the strategy flowchart appropriately. The "because statement" confirms a reader's understanding of what they are reading (i.e., reading between the lines). The word "because" allows the reader to make connections between their current and previous thoughts. Bilingual children in the intervention group reported more "because statements" in their think-aloud responses at time 2 compared to time 1. As well, participants made more "because statements" in English than French. This finding indicates that a single-session intervention influenced readers' strategic behaviour. From a feasibility perspective, the flowchart was an effective method of modifying children's reading strategy use.

Although intervention participants were using the flowchart, there were no gains in either English or French reading comprehension scores from time 1 to time 2. Nonetheless, participants responded to English questions more accurately than French questions. Particularly, participants responded to elaborative inference questions more successfully in English than French. English being the dominant language allowed

readers to look past the literal wording of the text and understand the text in a less concrete manner, which likely assisted in their responses to elaborative inference questions. Elaborative inference questions require participants to recruit meaning-based strategies and background knowledge to respond to the question. Participants responded to literal questions more successfully in French than English. Miller and Smith (1985) report that literal questions require recognition of similarities between words in the question and words in the text whereas inferential questions require a second level of recognition that includes implied meaning. With respect to literal questions, they require participants to remember the information found directly in the text to answer the question successfully. Our results suggest that children were more focused on the surface form of the text and struggled to extract information that was not directly stated in their non-dominant language.

4.6.1 Limitations

The contributions of this study should be considered in light of its limitations. Even though participants in the intervention group were able to use the flowchart, there may have been increased demands on cognitive load. As a result, readers may not have consolidated the content of the text into their mental representation. There were several steps that readers were required to do as part of the reading comprehension task (i.e., read the text, complete think-aloud responses using the flowchart method and remember the content from the text to answer each reading comprehension question). The mental capacity needed to follow the flowchart may have reduced readers' ability to remember content from the texts required to answer the reading comprehension questions. Additionally, participants in the study were recruited over social media and their guardians connected with the researcher if they were interested in their child

participating. Based on this recruitment model, participant parents chose to enroll their child in this study to provide their child an opportunity to practice reading in English and French if their child (a) enjoyed reading, or (b) struggled with reading. Therefore, the skill level and motivation level of the participants may have differed had we recruited from a classroom with all students participating rather than parents volunteering their child. Our recruitment mode was adopted because of the Covid-19 pandemic restrictions.

Since participants were recruited during the pandemic, the study was completed online. Participant guardians were asked to provide their child a quiet place to complete the tasks over the virtual platform. However, this could not be guaranteed based on each participant's living situation. Furthermore, participants may have become distracted by their surroundings while completing the task, which is an additional limitation to consider. Typically, participants are tested in a similar environment, free of distractions, but due to the current climate, this was not able to be achieved.

4.6.2 Next steps

The bilingual children in this study did not demonstrate significant gains in their reading comprehension when exposed to an intervention. Yet, children demonstrated that they were able to adopt the flowchart framework readily in their think-aloud responses. Additional support through a strategy intervention may result in gains in bilingual children's reading comprehension scores. For example, spending more time practicing using the flowchart with extra scaffolding over an extended period of time. A next step would include completing the same methodology over a longer time frame to observe gains in reading comprehension. The rehearsal of the flowchart and opportunities for scaffolding may enhance the readers' comfort level using the flowchart, which would

then provide more mental space for them to remember the text content and respond to the reading comprehension questions successfully.

4.7 References

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5 Chapter Five: Final Considerations

Use of reading comprehension strategies differentiates skilled bilingual readers from less skilled bilingual readers (Chapter Two). Knowing this, the latter two studies focused on implementing a reading strategy intervention to improve bilingual readers' comprehension performance in English and French (Chapter Three and Chapter Four). Previous intervention studies showed support for using the reciprocal teaching model (Okkinga et al., 2018; Palincsar, 1982; Pilten, 2016; Tarchi & Pinto, 2016), which incorporates a teacher explaining and modelling strategies to the student. In addition to collaborative practice between the teacher and student, the goal of reciprocal teaching is for the student to use the strategy independently. Few studies have used this technique with a single-session one on one intervention, which was the motivation for the current set of studies. In addition to the unknown outcomes of using a single-session intervention, a flowchart intervention was created to guide readers' strategy recruitment, based on the behaviours found in successful bilingual readers (Chapter 2). The following discussion will connect the findings from the three studies, provide overall conclusions, discuss limitations, propose future directions, and introduce implications for second language and immersion educators.

5.1 Overall Findings

The first research goal was to determine how bilingual readers recruit strategies in conjunction with one another while reading in their first and second language for the purpose of comprehension. Chapter 2 revealed how skilled and poor readers differed from each other with respect to their strategy recruitment. Skilled readers recruit a variety of strategies while reading. In addition, specific patterns of recruitment were associated with the successful readers. The pairing of an inference and any other strategy (i.e.,

summarizing, predicting, questioning, visualizing, commenting on the text) was associated with skilled reading in both English and French. Skilled readers also made connections between their thoughts as the text developed. For instance, the reader may have confirmed or rejected a prediction they made in an earlier think-aloud. Participants who made these connections were better comprehenders. Conversely, less skilled readers did not recruit the same patterns, but instead, they perseverated on isolated strategies, they did not make connections between their thoughts, and they made more incorrect statements. In sum, the reading behaviours that bilingual readers engage in while reading appears to differentiate whether that reader is skilled or less skilled; these behaviours appeared in both of their languages.

The knowledge gained from the bilingual adults and children in Chapter 2 informed the methodology of the studies reported in Chapter 3 and Chapter 4. Knowing that skilled readers rely on patterned strategy use influenced the development of a reading strategy intervention. Three behaviours associated with skilled reading were embedded in a flowchart: (1) pairing strategies, (2) employing various strategies, and (3) making connection between think-alouds. The goal was to determine if there were reading comprehension gains in child and adult bilingual readers when they are exposed to this reading strategy intervention. The flowchart intervention guided them in ways to combine the strategies and provided them time to practice before independently using the tool during the reading comprehension task. Adults and children were exposed to the same flowchart since similar patterns were observed across the adults and children in Chapter 2.

The study in Chapter 3 was conducted with bilingual adults and Chapter 4 was completed with fourth- to sixth-grade French Immersion students. Neither study found participant gains in reading comprehension performance after being exposed to the reading strategy intervention. The intervention did impact reading behaviours from pre-test and post-test. The “because statement” was used as an identifier for participants recruiting necessary inferences following another strategy. The quantity of “because statements” increased after the intervention for both adults and children. Even though the intervention did not influence readers’ comprehension performance, their think-aloud responses paired the strategies presented in the intervention.

The value of these three studies shows that the sequence in which participants recruit strategies is important for comprehension. Yet, teaching these patterns to readers in a single session, using a flowchart, may not be sufficient for improving comprehension performance. Reasons for this will be discussed in the limitations section of this chapter. Overall, the flowchart influenced readers to alter their think-aloud response patterns to match the intervention after one instructional session. Despite the fact that our comprehension analysis tool did not demonstrate gains in reading comprehension performance, this does not necessarily mean that participants’ mental text representations were not more comprehensive. Furthermore, the fact that the flowchart altered participants’ reading behaviour is promising that with more exposure, more practice and more opportunities to internalize these strategies, reading comprehension performance may result in observable improvements.

5.2 Comparing Bilingual Adults and Children

The methodology and analyses were similar in Chapters 3 and 4, which provides the opportunity to compare the nature of the findings from the bilingual child and adult

groups. However, caution should be exercised as there were some methodological differences. Specifically, the adult participants read 12 stories (i.e., 6 in English, 6 in French) while the child participants read 8 stories (i.e., 4 in English, 4 in French). The texts' difficulty level was also different and thus the questions posed were not the same across studies. Generally, the pattern of results was similar, but there were some specific findings that differed between the groups.

Language proficiency was assessed for these two studies since vocabulary and word reading have been shown to be strong predictors of reading comprehension (Gough & Tunmer, 1986; Scarborough, 2001). As expected, verbal fluency scores were higher in English than in French for both the adults and children. As well, English word reading scores were higher than French word reading scores for both groups. Since the readers in both studies read English more in their day-to-day than French, it is not surprising that they read English words more accurately than French words. Moreover, it is also not surprising that they were able to express more English vocabulary than French vocabulary. In Frid and Friesen's (2020) study, participants were more proficient English readers, which was reflected in their language proficiency assessment. Likewise, Friesen and Frid (2021) assessed their participants on receptive vocabulary and word reading. The findings indicated greater proficiency in English than French. All participants in these studies were drawn from the same population.

In both studies, there was no significant difference between English and French nonword reading performance. English orthography is opaque, which means there are more exceptions in spelling-sound relationships (Seymour et al., 2003). French orthography is more transparent, which means spelling-sound correspondences are

consistent and access to letter-sound conversions is likely more immediate (Artuso & Palladino, 2019). English nonword reading is likely less automatic than French. These findings in language proficiency have been shown repeatedly in the literature across different groups of bilinguals with different language pairings (Bialystok et al., 2005; Mumtaz & Humphreys, 2001). Furthermore, learning spelling-sound correspondences is a “finite” task and once it is mastered, it can become automatic. By fourth-grade, readers have developed the skill of understanding spelling-sound correspondences, which may be the reason for nonsignificant differences between English and French non-word reading. This finding is consistent with Schröter and Schroeder’s (2018) work, which demonstrated bilingual readers recognized nonwords in each of their languages equivalently. Chiat and Polišenská’s (2016) research also demonstrated that bilingualism did not impact readers’ nonword repetition, but it did impact their receptive vocabulary. These findings demonstrate that Chapters 3 and 4 support pre-existing research in this area of bilingual reading.

With respect to reading strategy behaviour by individuals in the intervention group, both studies showed increased “because statements” from pre-test to post-test. Furthermore, the participants exposed to the flowchart utilized the intervention strategies when completing their think-aloud verbalizations. However, the children displayed more “because statements” in English than French; no language differences were observed among the adults. Hara and Tappe (2016) investigated inference generating in bilingual children. They found that students made more inferences in their more dominant language than their less dominant language. This finding supports the contention that bilingual children made more “because statements” in English than French because the

former was their dominant language. Even though bilingual adults reported English as being their more dominant language, they have more experience with their less-dominant language (i.e., French) than the children. Thus, they may have been able to generate a similar number of “because statements” in French and English.

Reading comprehension was measured based on participants’ response to three reading comprehension questions per story. The three types of questions included a literal question (i.e., information found directly in the text), a necessary inference question (i.e., information not found directly within the text, but that can be inferred), and an elaborative inference question (i.e., information not found within the text, but can be inferred and may require the reader’s background knowledge). Readers’ performance on the three question types was assessed in Chapters 3 and 4. Of note, the adults and children did not exhibit the same pattern of results in terms of which types of questions were answered more accurately in each language. The results demonstrated that (1) adults performed better on the English literal questions in comparison to the French literal questions, but children performed in the reverse manner, and (2) adults performed better on inferential questions in comparison to literal questions, while children performed better on literal questions than inferential questions. The stories read by each group differed from each other due to the reading level of the adults and children. Consequently, the questions were different, making it difficult to directly compare the participants’ performances. Thus, the following remarks are speculative.

In terms of the discrepancy between English and French literal questions, the adult readers performed better on the English questions than the French ones, but the reverse pattern was observed for the child readers. This pattern was unexpected for the

children because they read more in English than in French. Given that children had less French proficiency, they may have focused primarily on the surface form of the French texts. This focus may have enabled better processing of text details and consequently may have resulted in better performance on the literal questions. Literal questions do not require much more understanding beyond the information found directly in the text. When reading in English, children may have been better able to extract the gist of the text through inferencing, which may have resulted in forgetting the details needed to successfully answer the literal questions. To support this argument, Frid and Friesen (2020) found that bilingual children summarized much less in English than in French; making links to the textbase appears to be a necessity for responding to literal questions.

With respect to the overall differences between literal questions and inferential questions, adults performed better on necessary inference questions than on literal questions while children performed better on literal questions than on elaborative inference questions. With respect to the adults, they were better able to think beyond the text in comparison to the children. Yet, the children demonstrated a different pattern. There did not appear to be a significant difference between their ability to answer literal questions and necessary inference questions. However, they performed better on the literal questions than on the elaborative questions, which may be due to the complexity of thinking required to make an elaborative inference beyond the text. Since children are still learning and mastering their reading strategies, understanding the information found in the text is a simpler task than making elaborative inferences.

Based on this information, it is apparent that not all question types are answered equally and different groups may be better able to answer different types of questions.

One component of the flowchart intervention was the guidance of recruiting several strategies in conjunction. Therefore, teaching students to paraphrase the text, then make an inference, could assist in their ability to answer literal and inferential questions across languages. Even though the flowchart included these strategies to be recruited together, participants ultimately had the choice of which pathway to follow. Some individuals may not have chosen to summarize, then make an inference, which could have impacted their ability to answer those specific question types. Therefore, guiding participants to choose specific flowchart pathways may have led to them to answer the questions more accurately.

5.3 Limitations & Next Steps

This dissertation's findings should be considered alongside its limitations. It is important to acknowledge the limitations associated with the novel intervention tool (i.e., flowchart). The flowchart incorporated many steps and required sustained attention and focus while learning how to use the tool as well as implementing the tool. We did not screen participants for executive functioning skills (i.e., attention, memory) so we are unsure whether the steps required for the intervention were overwhelming the readers. The cognitive demand required for the reading comprehension task was substantial since participants had to remember (1) the method of using the flowchart, (2) their think-aloud responses to make connections in succeeding think-alouds, and (3) details from the story to answer the questions. Nevertheless, we tried to mitigate these concerns by giving the participants the opportunity to practice using the flowchart and ask questions throughout the practice and post-test administration. A next step may include having participants fill out a blank worksheet while reading to jot down some of their thoughts. Then, participants would have an easier time remembering their think-aloud responses, monitor

their comprehension, and answer the reading comprehension questions more successfully. To investigate participants' attitudes toward using the flowchart, a feasibility study on how participants felt about the intervention may be helpful. This would provide information on whether participants found all the steps overwhelming or simple to follow.

The flowchart tool incorporated the reading behaviour patterns of skilled readers (i.e., various strategy pathways, strategies followed by “because statements”, opportunities to make connections), but still provided the readers with choice. In other words, the readers were able to recruit whichever strategies they desired while completing their think-aloud responses. Consequently, the strategies participants selected to use may not have been a good fit for the part of the text they were reading. In addition to this concern, we did not assess whether the readers in Chapters 3 and 4 were successful or less-successful readers. Therefore, we were potentially guiding less-successful readers to recruit skilled reading behaviours in a single session. This is where the argument arises that a single session may not be sufficient. Especially if the reader is less skilled, the reader may require more time to consolidate those strategies and understand how and when to recruit them appropriately. Next steps to address this limitation may be, first, assessing whether readers are successful or less-successful, then, spending several sessions reviewing the flowchart and having the participant practice.

To determine if participants were using the flowchart, we counted the frequency of “because statements” that linked strategies together. This approach was of critical importance because it enabled us in a straightforward way to determine if participants were pairing their strategies together meaningfully. However, this method did not provide

information about the favoured pathways, or the paths used more frequently by readers. To understand whether participants were using the flowchart effectively, a next step may include exploring how the participants used the different pathways in their think-aloud responses after the intervention in comparison to their pre-test think-aloud responses.

In addition to the future directions described above, it is important to consider the limitations of this research to inform methodology decisions for future intervention work. Assessing whether readers are successful or less-successful will be an important step in determining the time spent teaching and reviewing a strategy intervention (i.e., flowchart).

5.4 Implications for Educators

A benefit of conducting this research is that the information gained can be utilized by second-language or immersion educators. This research has implications for individuals working in a school setting since reading strategies are often explicitly taught in the classroom. Recruiting strategies in conjunction with other strategies is important to teach to young children who are reading for comprehension (Akkakoson, 2013; Barry, 2002; Tsai et al., 2010). Chapter 2 outlined that there are stark differences in how skilled and poor readers recruit strategies to aid their comprehension. Awareness of these differences in young readers is critical for educators to both assess strategy use in their students and to then engage in explicit strategy instruction to support students' needs.

With this knowledge in mind, struggling readers would likely be best to target for a reading strategy intervention. Dansereau (1985) found that less-skilled readers may improve overall learning if they receive even a small amount of training related to effective reading comprehension strategies. In other words, it is important for second-

language educators to be aware of their students' reading strategy abilities to determine whether the student requires additional support.

In the Grade 4 Ontario French Immersion reading curriculum, students are expected to use a range of reading comprehension strategies (i.e., activate prior knowledge, visualize, make, and confirm predictions) (Ontario Ministry of Education, 2013). Still, think-aloud protocols are not typically completed at the classroom-level, which makes it challenging for teachers to be aware of their students' reading strategy capabilities. Friesen and Haigh (2018) provided advice for teachers on making strategy use an explicit process. Teachers must (1) identify the strategies students are currently using by having them report on their thoughts, (2) identify the common strategies recruited by the students and if they lead to successful textual understanding, (3) introduce effective strategies to the students, (4) explicitly discuss how a text is remembered and how strategies assist with text representation, and (5) teach and encourage students to evaluate their strategy choices and select different strategies when necessary. Implementing these phases will be helpful for teachers to understand where their students are in their learning and where they need more support with respect to reading strategy awareness and recruitment, as well as reading comprehension performance.

The findings from the intervention studies emphasize the need for an assessment of the flowchart intervention before recommending it to a classroom setting. Ideally, a longer intervention with more rehearsal opportunities may lead to better reading comprehension performance. Practicing the strategies over a lengthier time may enhance readers' comfort in recruiting them. Ross and Begeny (2015) administered a reading

fluency intervention to students and found that the longer intervention resulted in gains in comparison to the shorter intervention. Regardless of readers' comprehension, this single-session strategy instruction was able to adjust readers' strategic behaviour quickly. Furthermore, the five steps of strategy instruction appear to be sufficient in teaching readers to alter their reading behaviour. These five phases include (1) explanation, (2) modeling, (3) collaborative use, (4) guided practice, and (5) independent use (Duke & Pearson, 2002; Ferris & Hedgcock, 2013; Grabe, 2004; Spörer et al., 2009). Teachers who choose to implement a reading strategy intervention with the purpose of teaching students to change their current reading behaviour to a more successful manner, should consider adopting these five phases.

There are several takeaway messages for educators interested in implanting a reading strategy intervention with bilingual students. First, determining students' base strategy recruitment ability through the strategies suggested by Friesen and Haigh (2018) is crucial in deciding who should participate in the intervention. In other words, identifying students as successful readers and less-successful readers is a helpful preliminary step. Next, using the five steps of instruction (Duke & Pearson, 2002) is important to alter the behaviours of each student. Along with this, being intentional about which strategies to include in the intervention is necessary depending on the goal of the intervention. If the goal is to respond to specific types of comprehension questions, for example, answering necessary inference questions, this requires the individual to recruit necessary inferences during their reading. Keeping these considerations in mind will likely produce effective changes in reading behaviour and potentially reading comprehension performance.

5.5 Final Considerations

The findings from this dissertation contribute to existing literature in the field of reading strategy interventions because it provides knowledge about a novel intervention tool (i.e., flowchart) and the length of time needed to teach and implement a flowchart strategy intervention. Despite the lack of reading comprehension gains, this research demonstrates that this methodology can impact the reading behaviour of bilingual adults and bilingual children. Furthermore, the flowchart is effective in altering readers' strategy recruitment, but readers may not be effectively recruiting strategies to assist them in responding to comprehension questions related to the texts. Increasing the time spent on teaching the flowchart may be an appropriate next step to ensure readers know how to recruit strategies based on the question type they will be answering. Ross and Begeny (2015) noted that lengthier interventions produce better results. In addition, identifying skilled and less skilled readers before introducing the flowchart may be crucial to decide on intervention length. Using Palincsar's (1982) reciprocal teaching model seems to be a good way to introduce the flowchart but may require more collaborative teaching and independent practice. With these final considerations in mind, it is important to note that the guided strategy intervention was able to alter readers' metacognitive strategy recruitment, but with more attention to the readers' skill level and the strategies needed to answer particular comprehension questions, the future of this research may lead to this flowchart strategy intervention producing better reading comprehension performance.

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Appendices

Appendix A: Language Experience Questionnaire

1. Today's date (day/month/year): _____

Part A – Background Information

The following information refers to YOU:

2. Age: _____
3. Gender: _____
4. Country of birth: _____
5. Have you ever had a vision problem? Yes No
- a. If so, do your glasses/contacts correct your vision to normal? Yes No

The following information refers to your PARENTS:

6. Country of birth of PARENT 1: _____

If not born in Canada, when did parent 1 come to Canada (year): _____

List the language known by parent 1, *in order of languages learned (learned first to learned last)*:

List the language known by parent 1, *in order of fluency (most fluent to least fluent)*:

7. Country of birth of PARENT 2: _____

If not born in Canada, when did the parent 2 come to Canada (year): _____

List the language known by parent 2, *in order of languages learned (learned first to learned last)*:

List the language known by parent 2, *in order of fluency (most fluent to least fluent)*:

Part B – Language Experience

8. Do you **understand** any language other than English and French Yes No

If you answered “Yes”, please specify: _____

9. Which language did you first learn? (please circle)

English French Other (please specify): _____

10. What percentage of the time are you *currently* exposed to each language (total = 100%)?

	English	French	Other Language	Total
Speaking				= 100
Listening				= 100
Reading				= 100
Writing				= 100

11. What percentage of the time do you *currently* use each language with each group of people?

	English	French	Other Language	Total
Family				= 100
Friends				= 100
Classmates				= 100
Co-Workers				= 100

12. How often do you mix words or sentences from English and French in your speech?

Never Rarely Occasionally Sometimes Frequently Very Frequently Always

1 ___ 2 ___ 3 ___ 4 ___ 5 ___ 6 ___ 7 ___

13. For each of the English and French skills of understanding, speaking, reading, and writing, please indicate the age at which you first started to acquire the skill, the place in which you learned the skill (e.g. home, school), and rate the ability with which you can currently perform the skill. (circle one number per skill).

English Language Skills

	Starting age	Place (home, school)	Ability									
			very poor									native-like
Understanding			1	2	3	4	5	6	7	8	9	10
Speaking			1	2	3	4	5	6	7	8	9	10
Reading			1	2	3	4	5	6	7	8	9	10
Writing			1	2	3	4	5	6	7	8	9	10

French Language Skills

	Starting age	Place (home, school)	Ability									
			very poor									native-like
Understanding			1	2	3	4	5	6	7	8	9	10
Speaking			1	2	3	4	5	6	7	8	9	10
Reading			1	2	3	4	5	6	7	8	9	10
Writing			1	2	3	4	5	6	7	8	9	10

14. Approximately how many hours a week do you read in English? _____

15. Approximately how many hours a week do you read in French? _____

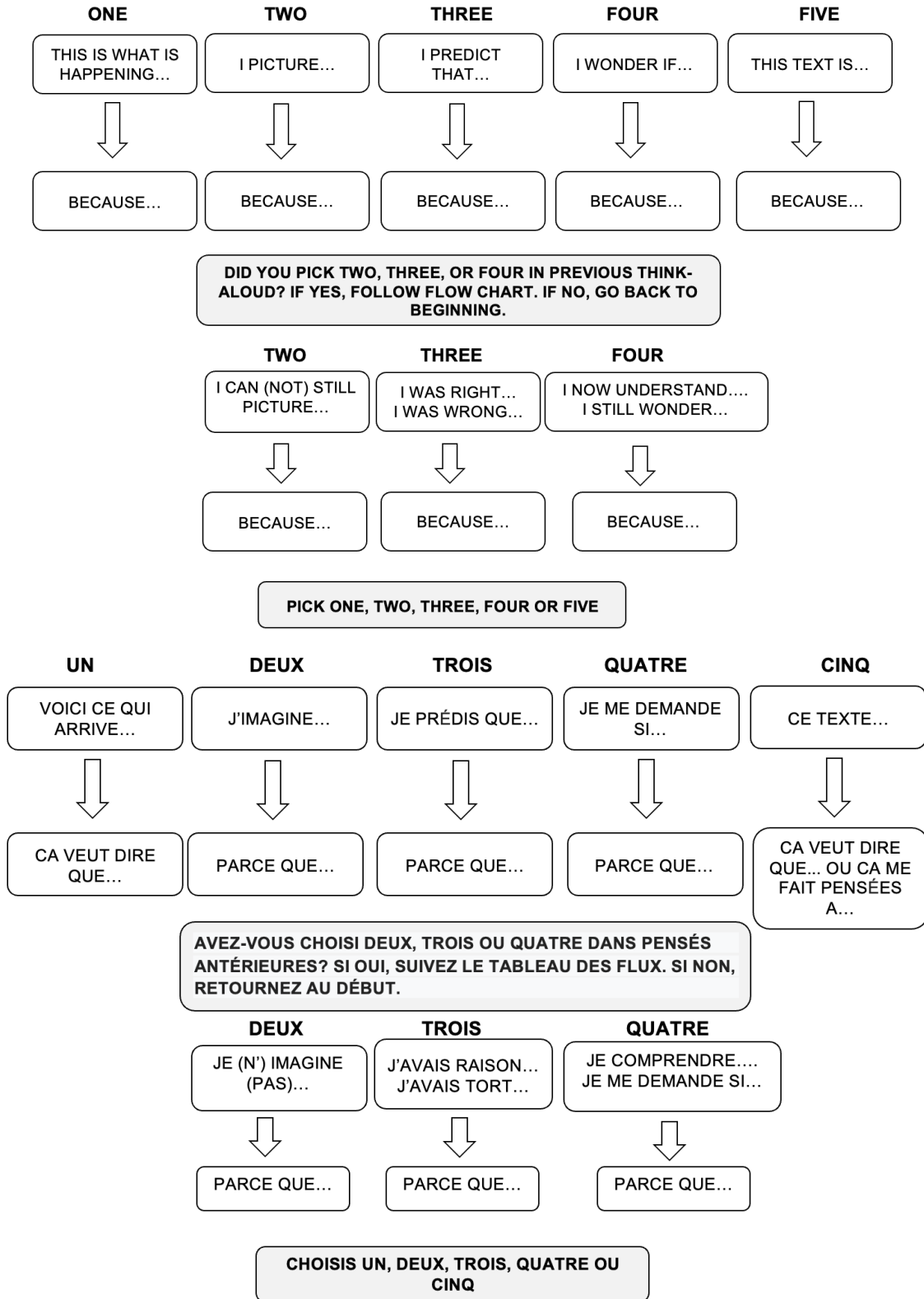
16. Please rate how strongly you agree with the following statements by checking the boxes that best apply:

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Don't know
I prefer to read in English						
I am a good English reader						
I enjoy reading in English						
I prefer to read in French						
I am a good French reader						
I enjoy reading in French						

Appendix B: Prompting Statements

English Prompt	French Prompt
I imagine that...	J'imagine que...
I predict that...	Je prédis que...
I wonder if...	Je me demande si...
This means that....	Ça veut dire que...
This makes me think of...	Ça me fait penser à...

Appendix C: Flowcharts for Bilingual Individuals in the Intervention Group



Appendix D: Parent/Guardian Questionnaire - Language Background

1. Today's date (day/month/year): _____
2. Relationship to participant (please circle): Mother Father Other: _____

Part A – Background Information

The following information refers to your CHILD:

3. Date of birth (day/month/year): _____
4. Gender: _____
5. Grade: _____
6. Country of birth: _____

Part B – Guardians' Background Information

The following information refers to the Guardians:

7. Country of birth of GUARDIAN 1: _____

If not born in Canada, when did guardian 1 come to Canada (year): _____

List the language known by guardian 1, *in order **learned** (from earliest to latest)*:

List the language known by guardian 1, *in order of **fluency** (most fluent to least fluent)*:

8. Please place a check mark (✓) next to Guardian 1's highest level of Education:
 - Some High School
 - High School Graduate
 - Some College or College Diploma
 - Bachelor's Degree
 - Graduate or Professional Degree

9. Country of birth of GUARDIAN 2: _____

List the language known by guardian 2, *in order **learned** (from earliest to latest)*:

List the language known by guardian 2, *in order of **fluency** (most fluent to least fluent)*:

10. Please place a check mark (✓) next to Guardian 2's highest level of Education:

- Some High School
 High School Graduate
 Some College or College Diploma
 Bachelor's Degree
 Graduate or Professional Degree

Part C – Child's Language Experience

11. Does your child **understand** any language other than English and French Yes No

If you answered "Yes, please specify: _____

12. Which language did your child first learn? (please circle)

English French Other (please specify): _____

13. What language is spoken most at home?

- English
 French
 Other (please specify): _____

14. How long has your child been enrolled in a French immersion school?

_____ years

15. Approximately how many hours a week does your child read in English at home?

_____ hours

16. Approximately how many hours a week does your child read in French at home?

_____ hours

17. Please rate how strongly you agree with the following statements by checking the boxes that best apply
(*English*):

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Don't know
My child prefers to read in English						
My child is a good English reader						
My child enjoys reading in English						

18. Please rate how strongly you agree with the following statements by checking the boxes that best apply
(*French*):

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Don't know
My child prefers to read in French						
My child is a good French reader						
My child enjoys reading in French						

Appendix E: Ethics Approval Forms

Ethics Approval for Chapter 2 (Frid & Friesen; 2020)



**Western
Research**

Research Ethics

Western University Non-Medical Research Ethics Board NMREB Delegated Initial Approval Notice

Principal Investigator: Dr. Deanna Friesen
Department & Institution: Education, Western University

NMREB File Number: 109030
Study Title: Reading Comprehension and Strategy Use in Fourth and Fifth Grade French Immersion Students

NMREB Initial Approval Date: April 19, 2017
NMREB Expiry Date: April 19, 2018

Documents Approved and/or Received for Information:

Document Name	Comments	Version Date
Western University Protocol	Received April 19, 2017	
Assent		2017/04/19
Caregiver Letter of Information & Consent		2017/03/24
Instruments	Parental Questionnaire	2017/03/24
Instruments	English and French Prompting Statements for Think-Aloud - Received February 9, 2017	
Instruments	PPVT Plate - Received February 9, 2017	
Instruments	English TOWRE - Received February 9, 2017	
Instruments	French TOWRE - Received February 9, 2017	
Data Collection Form/Case Report Form	TOWRE Form - Received February 9, 2017	
Instruments	English and French Passages - Received March 24, 2017	
Other	Translation Attestation Letter - Received for Information	2017/04/10

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the above named study, as of the NMREB Initial Approval Date noted above.

NMREB approval for this study remains valid until the NMREB Expiry Date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario.

Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB.

The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00009941.

Ethics Approval for Chapter 2 (Friesen & Frid, 2021)



Western Research

Date: 14 September 2020

To: Dr. Deanna Friesen

Project ID: 108374

Study Title: Reading Comprehension and Strategy Use in Bilingual Pre-Service Teachers

Application Type: Continuing Ethics Review (CER) Form

Review Type: Delegated

Meeting Date: October 2 2020

Date Approval Issued: 14/Sep/2020

REB Approval Expiry Date: 22/Sep/2021

Dear Dr. Deanna Friesen,

The Western University Non-Medical Research Ethics Board has reviewed this application. This study, including all currently approved documents, has been re-approved until the expiry date noted above.

REB members involved in the research project do not participate in the review, discussion or decision.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

The Office of Human Research Ethics

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Ethics Approval for Chapter 3



Date: 14 August 2020

To: Dr. Deanna Friesen

Project ID: 114457

Study Title: Reading Strategy Intervention and Reading Comprehension Success in English-French Bilingual Adults

Application Type: Continuing Ethics Review (CER) Form

Review Type: Delegated

Meeting Date: September 4 2020

Date Approval Issued: 14/Aug/2020

REB Approval Expiry Date: 22/Aug/2021

Dear Dr. Deanna Friesen,

The Western University Non-Medical Research Ethics Board has reviewed this application. This study, including all currently approved documents, has been re-approved until the expiry date noted above.

REB members involved in the research project do not participate in the review, discussion or decision.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

The Office of Human Research Ethics

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Ethics Approval for Chapter 4



Date: 16 July 2021

To: Dr. Deanna Friesen

Project ID: 115714

Study Title: Reading Strategy Intervention and Reading Comprehension Success in English-French Bilingual Children

Application Type: Continuing Ethics Review (CER) Form

Review Type: Delegated

Date Approval Issued: 16/Jul/2021

REB Approval Expiry Date: 05/Aug/2022

Dear Dr. Deanna Friesen,

The Western University Non-Medical Research Ethics Board has reviewed this application. This study, including all currently approved documents, has been re-approved until the expiry date noted above.

REB members involved in the research project do not participate in the review, discussion or decision.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

The Office of Human Research Ethics

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Curriculum Vitae

Name: Bailey Frid

Post-secondary Education and Degrees: University of Western Ontario
London, Ontario, Canada
2012-2016 B.A.

The University of Western Ontario
London, Ontario, Canada
2016-2018 M.A.

The University of Western Ontario
London, Ontario, Canada
2018-2022 Ph.D.

Honours and Awards: Province of Ontario Graduate Scholarship
2018-2019

John Dearness Memorial Graduate Award
2018-2019

Related Work Experience Teaching Assistant
The University of Western Ontario
2020-2021

Research Assistant
The University of Western Ontario
2016-2017; 2017-2018; 2018-2019; 2019-2020

Publications:

Frid, B., & Friesen, D. C. (2021). An investigation of reading strategy patterns recruited by bilingual adults and children. *The Canadian Modern Language Review*, 77(3), 212-233.

Friesen, D. C., & **Frid, B.** (2021). *Predictors of successful reading comprehension in bilingual adults: The role of reading strategies and language proficiency. Languages*, 6(18), 1-23.

Frid, B., & Friesen, D. C. (2020). Reading comprehension and strategy use in fourth-and fifth-grade French immersion students. *Reading and Writing*, 1-21.

Conference Presentations:

Frid, B. & Friesen, D. C. (2021, July). *An analysis of reading strategy patterns in bilingual think-aloud data.* Poster presented at the 13th Annual International Symposium of Bilingualism, Warsaw, Poland (Virtual).

- Friesen, D. C., & **Frid, B.** (2019, June). *Strategy Use Predicts Reading Comprehension Success in Bilingual Adults and Children*. Paper presented at the 12th Annual International Symposium of Bilingualism, Edmonton, AB.
- Frid, B.**, & Friesen, D. C. (2019, June). *Strategy Use Predicts Reading Comprehension Success in French Immersion Students*. Paper presented at the Canadian Society for Studies in Education Annual Conference, Vancouver, BC.
- Friesen, D. C., **Frid, B.**, & Schmidt, K. (2019, April). *Reading Comprehension and Strategy Use in Elementary School Children: Evidence from Students with Diverse Language Experience*. Poster presented at Faculty Research Partners Day, London, ON.
- Frid, B.**, & Friesen, D. C. (2019, March). *Strategy Use Predicts Reading Comprehension Success in French Immersion Students*. Paper presented at the Graduate Research in Education Symposium, London, ON.
- Frid, B.**, & Friesen, D. C. (2018, November). *Reading Comprehension and Strategy Use in Fourth- and Fifth-Grade French Immersion Students*. Poster presented at Psychonomic Annual Conference, New Orleans, LA.
- Frid, B.**, & Friesen, D. C. (2018, April). *Reading Comprehension and Strategy Use in Fourth- and Fifth-Grade French Immersion Students*. Paper presented at the Graduate Research in Education Symposium, London, ON.
- Frid, B.**, & Friesen, D. C. (2018, March). *Reading Comprehension and Strategy Use in Bilingual Pre-Service Teachers*. Poster presented at the Western Research Forum, London, ON.
- Friesen, D. C., **Frid, B.**, & Haug, K. (2017, July). *Reading Comprehension and Strategy Use in Bilingual Pre-Service Teachers*. Poster presented at the Society for the Scientific Study of Reading Annual Conference, Halifax, NS.
- Frid, B.**, & Friesen, D. C. (2017, April). *Reading Comprehension and Strategy Use in Fourth- and Fifth-Grade French Immersion Students*. Round table presentation at the Graduate Research in Education Symposium, London, ON.
- Frid, B.**, & Ansari, D., & Leibovich, T. (2016, April). *2, 4, 6, 8, Do Size and Order Share a Cognitive Trait?* Poster presented at the Undergraduate Honours Thesis Poster Presentation, London, ON.